The Status of Water Quality in Arizona – 2002

Volume I. Arizona's Integrated 305(b) Assessment and 303(d) Listing Report

EQR02-04

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Further Monitoring, Assessment, and TMDL Information

ADEQ's Web Site – Current information about programs and status of many projects can be downloaded from ADEQ's Web Site: http://www.adeq.az.us

ADEQ's Programs -- Further information about water quality ambient monitoring data, standards, and assessments can be obtained by contacting the following ADEQ program staff:

Assessments: Diana Marsh (602) 771-4545
Bioassessment: Patti Spindler (602) 771-4543
Lakes monitoring: Susan Fitch (602) 771-4541
Fish advisories: Sam Rector (602) 771-4536
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208 Planning: Edwina Vogan (602) 771-4606
Water Quality Improvement Grants Program: Sandy Sutton (602) 771-4635
Watershed Management Program: ~~Kris Randall~~ Susan Ward (602) 771-4509

A more comprehensive list of water quality protection programs is provided in the final appendix of this report (**Appendix E**).

Other Agencies -- Data was also obtained from a variety of sources outside the agency. Contact the following agencies to obtain further information about their monitoring programs or copies of their data:

Arizona Department of Water Resources - Basic Data (602) 417-2457
Arizona Game and Fish Department (602) 789-3260
- Urban Lakes Program (602) 789-3268

Arizona State Parks
- Slide Rock State Park (520) 639-2962

Environmental Protection Agency Region IX (San Francisco)
- 303(d) and TMDL's (415) 972-3416 (Dave Smith)
- 305(b) Assessments (415) 972-3462 (Terry Fleming)
- Standards Development (415) 972-3498 (Gary Wolinsky)
- Nonpoint Source (415) 972-3444 (Ephraim Leon-Guerrero)

Mohave County Health Department (Lake Havasu) (520) 453-0712
National Parks Service
- Glen Canyon National Recreation Area (520) 608-6377
- Grand Canyon National Park (520) 638-7905 (John Rihs)

Salt River Project (602) 236-5900 (Greg Elliott)
Southern Nevada Water Authority (702) 258-3948 (Jeff Johnson)
US Army Corps of Engineers (213) 452-3529 (Robert Stewart)
US Bureau of Land Management/Phoenix (602) 580-5500 (Jim Renthal)
US Bureau of Reclamation
- Colorado Grand Canyon (520) 556-7051
- Upper Colorado Region (801) 524-3700 (Jerry Miller)
- Lake Powell (928) 608-6377 (Mark Anderson)

US Fish and Wildlife Service (602) 640-2720 (Kirke King)
US Forest Service
- Apache-Sitgreaves National Forest (928) 333-4301
- Coconino National Forest (520) 527-3600
- Coronado National Forest (520) 670-4552 (Robert Lafevre)
- Kaibab National Forest (928) 635-8200 (Dave Brewer)
- Prescott National Forest (928) 567-4121 (Michelle Girard)
- Tonto National Forest (602) 225-5200 (Grant Loomis)

US Geological Survey (480) 379-3087 (Cheryl Partin)
- NAWQA (520) 670-6135 (x223) (Gail Cordy)

Table of Contents

TABLES

FIGURES

I. Arizona's 2002 Integrated Assessment and Listing Process

Why do we write this report?

This biennial report consolidates reporting requirements under the federal Clean Water Act sections 305(b) (assessments), 303(d) ("impaired" waters list), 106 (monitoring), 204 (grants), 319 (nonpoint source), and 314 (lakes program). It incorporates recommendations made in the Environmental Protection Agency's (EPA) *2002 Integrated Water Quality Monitoring and Assessment Report Guidance* issued in November 2001. This report also provides information required in Arizona's new state statute (Arizona Revised Statute 49-231 through 49-238) and new state Impaired Waters Identification rules (Arizona Administrative Code R11-18-601 through 606).

In addition, Arizona Department of Environmental Quality (ADEQ) recognizes that this report can provide many state and federal agencies, organizations, and interested parties with a current reference document on the status of surface and ground water quality in Arizona. The following objectives are fulfilled by the publication of this water quality assessment report:

- Report on statewide surface and ground water quality in Arizona (excluding tribal lands);
- Identify and delineate all surface waters assessed;
- Identify the status of designated use support for individual surface waters based on numeric or narrative water quality standards;
- Document the basis for ground water and surface water assessment determinations;
- Identify pollutants or water quality characteristics that cause impairment;
- Identify possible sources of identified pollutants;
- Indicate where standards are exceeded solely due to natural conditions;
- Describe the state's monitoring program and progress toward achieving comprehensive assessments for all surface waters;
- Identify where additional monitoring may be needed to complete assessments (new Planning List) or support the development of Total Maximum Daily Load (TMDL) analyses, including a schedule for this monitoring;
- Identify and prioritize where additional TMDLs need to be completed;
- Provide opportunity for public review and respond to comments concerning assessments and the state's 303(d) listing proposals;
- Provide information to the public and other agencies regarding:
  - ADEQ's ongoing water quality improvement activities;
  - Regulatory programs to protect and improve water quality; and
  - Available water quality data and related studies in Arizona.

This report was written to be understandable for both technical and nontechnical audiences. Technical terms, acronyms, and abbreviations used in his document are defined in **Appendix A.** Additional appendices in Volume I and monitoring tables in Volume II contain more detailed information referenced by technical staff.

Status of new federal regulations and guidance.

New Federal Regulations – The new federal regulations pertaining to listing impaired waters and completing TMDLs, scheduled to go into effect in October 2001, have been deferred by EPA, and were not used in this assessment.

New Federal Guidance – In November 2001, EPA issued "2002 Integrated Water Quality Monitoring and Assessment Report Guidance" concerning the development and submission of the 2002 305(b) water quality report and the 303(d) List of impaired waters. This guidance recommended that states submit an integrated water quality assessment report that included the state's 303(d) listed waters. **Table 1** indicates the information EPA requested, and where this information can be found in this report.

Table 1. EPA Requested Data or Information

Data or Information Requested	Data or Information Provided in This Report
Geographic delineations of each surface water assessed based on the new National Hydrography Dataset	Arizona is providing a GIS coverage which is compatible with and can be converted to the National Hydrography Dataset.
Status of and progress toward achieving comprehensive assessments of all waters.	Chapter IV provides statewide status of surface water quality assessments and Chapter Vi provides an overview of ground water quality assessments. Chapter Vil describes how ADEQ's monitoring programs are being modified to achieve more comprehensive assessments.
Water quality standard attainment determinations for each surface water assessed.	Volume II provides detailed monitoring tables for each surface water assessed arranged by watershed. These tables clearly indicate the basis for each assessment. Individual surface water quality assessments are provided in Volume I, Chapter V.
Identify additional monitoring that may be needed to determine water quality standard attainment status and, if necessary, to support development of TMDLs.	The assessment table in Chapter V indicates whether a surface water will be on the Planning List or TMDL list and the pollutant(s) of concern. Monitoring activities are being developed based on this table.
Schedules for additional monitoring planned for each surface water assessed.	Chapter VII describes ADEQ's monitoring programs, how these programs are integrated within the agency and with other agencies, and how waters on the Planning List will be prioritized for monitoring.
Surface waters and pollutants still requiring TMDLs	Chapter V and Appendix D identify all assessed waters according to five categories and indicate the pollutant(s) of concern. Category 5 indicates impaired waters requiring a TMDL.
TMDL development schedules reflecting the priority ranking of each surface water and/or pollutant combination.	Chapter V, Table 27 identifies the priority ranking and a schedule for completing TMDLs for each pollutant impairing a surface water.
A description of the assessment and listing methodology used to develop Clean Water Act section 303(d) Lists and section 305(b) Assessments.	Chapter III describes the assessment and listing methods used. Appendix B provides a copy of the Impaired Waters Identification Rules and Arizona's statute concerning the listing process and TMDL development.
A description of the public participation process involved in developing the 303(d) list.	The public participation process is described in Chapter V.

In accordance with EPA's November 2001 guidance, Arizona has made a number of structural changes in how it identifies categories of surface waters. EPA guidance suggests that surface waters be placed on the following five-part list of surface waters depending on the sufficiency of data and number of exceedances as defined in Arizona's assessment and listing methods (see discussion in Chapter III).

- Part 1. Surface waters where <u>all</u> water quality standards are being attained.
- Part 2. Surface waters are attaining some designated uses but there is insufficient data to assess the remaining uses. Surface waters assessed as "threatened" are included in this part.
- Part 3. Surface waters with insufficient data to assess any designated use.
- Part 4. Surface waters are assessed as "not attaining" one or more designated use but a Total Maximum Daily Load (TMDL) analysis will not be required for one of the following reasons:
  - 4 A. A TMDL has already been completed and approved by EPA but the water quality standards are not yet being attained.
  - 4 B. Other pollution control requirements are reasonably expected to result in the attainment of water quality standards by the next regularly scheduled listing cycle.
  - 4 C. The impairment is <u>not</u> related to a "pollutant" loading but rather caused by "pollution" (e.g., hydrologic modification).
- Part 5. Surface waters are impaired for one of more designated uses by a pollutant and require development of a TMDL.

Note that Arizona is including "threatened" waters in Part 2 rather than Part 5 until federal regulations clarify whether "threatened" waters must be included on the 303(d) List of impaired waters. Assessment criteria are described in Chapter III. Chapter V relates these five categories to monitoring priorities.

New state statutes and impaired waters identification rules take hold.

Since the last assessment report was issued in 2000, new state statutes and regulations have been adopted which regulate the identification of impaired waters and the prioritization and completion of Total Maximum Daily Load (TMDL) analyses.

A Total Maximum Daily Load Analysis (TMDL)

A TMDL is a written, quantitative plan and analysis to determine the maximum loading on a pollutant basis that a surface water can assimilate and still attain and maintain a specific water quality standard during all conditions. The TMDL allocates the loading capacity of the surface water to point sources and nonpoint sources identified in the watershed, accounting for natural background levels and seasonal variation, with an allocation set aside as a margin of safety.

New State Statues -- In 2000, Arizona Revised Statute Title 49, sections 231-238 was adopted **(Appendix B)**, establishing requirements for identifying impaired waters which require TMDL analyses and for development of TMDLs. For 303(d) listing decisions, the statute requires that ADEQ:

- Adopt, by rule, the methods used to identify "impaired" waters;
- Use only reasonable current credible and scientifically defensible data;
- Consider the nature of the water (e.g., ephemeral, intermittent, or perennial) in assessing whether a surface water is impaired;
- Determine whether pollutant loadings solely from naturally occurring conditions are sufficient to exceed a water quality standard, and if so the surface water is not listed as "impaired";
- Must adopt narrative implementation procedures through a public process before using narrative standards to identify impaired waters. These procedures must identify the objective basis for determining a narrative or biological standard violation; and
- Review all surface waters on the current 303(d) List (approved 1998) to determine whether the data fulfills requirements established in the new impaired waters identification rules (credible and sufficient data requirements, etc.). If the data used to list the water or more current data do not meet the requirements of the new rule, ADEQ cannot place the surface water on the 2002 303(d) List.

New Impaired Waters Identification Rules -- ADEQ developed Impaired Waters Identification Rules (R18-11-601through R18-11-606) **(Appendix B)** as required in the state statute discussed above. These rules establish the following:

- "Credible data" criteria;
- Data submission and record keeping;
- General data interpretation requirements;
- Criteria for placing a surface water on the Planning List for further monitoring;
- Criteria for identifying surface waters as impaired and placing it and identified pollutants on the 303(d) List;
- Criteria for removing a pollutant or surface water from the 303(d) List; and
- Criteria for prioritizing the 303(d) listed waters for TMDL development.

Changes in the assessment process

In previous water quality reports, ADEQ assessed surface waters using one set of assessment criteria, and then applied a separate set of criteria to determine which surface waters merited being identified as "impaired" and included on the 303(d) List. This was a two-step process that allowed ADEQ to do "evaluated" assessments based on limited monitoring data and screening values for narrative standards (e.g., contaminated sediment, fish kills, fish tissue contamination). In many cases the data was insufficient to support a 303(d) listing. However, using two sets of criteria has been confusing to the public. To eliminate this confusion and to follow new EPA guidance on consolidating the two processes, ADEQ merged the assessment and 303(d) listing criteria so that any surface water assessed as "impaired" will be included on the 303(d) List.

A desire to minimize potential erroneous assessments has also resulted in several significant changes in the monitoring, assessment, and the 303(d) listing process. The amended monitoring program is discussed in Chapter VII and the new assessment and listing process is discussed in Chapters III and V in more detail. The most significant changes in the process are:

- All data used for assessments must meet "credible data" requirements established in the Impaired Waters Identification Rule.

- Instead of assessing a surface water as in "full," "full but threatened," "partial," or "non-support" of its designated uses, a surface water is assessed as either "attaining," "impaired," "not attaining," or "inconclusive."
- Instead of a minimum of two samples, adequate data for assessments must meet the following requirements:
  - To assess as "attaining" uses, collect samples at a minimum of three (3) monitoring events that provide seasonal representation and core parametric coverage for the designated uses assigned to that surface water; or
  - To assess as "impaired," collect a sufficient number of samples to meet the test of impairment identified in the Impaired Waters Identification Rule.
- To apply narrative standards to the listing process, state statute requires that the Department must first adopt narrative implementation procedures for each narrative standard through a public process. ADEQ is still in the process of developing these documents, and therefore, was not able to list any surface water as impaired solely on the basis of narrative standard violations.

II. Water? All I See Are Dry River Beds!

Arizona's ecologic, hydrologic, and geographic diversity.

Arizona is a large state with diverse ecological and geological conditions. Its geographical extent is equivalent to the combined size of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, and New York. All four of the deserts of North America occur in Arizona, along with three mountain ranges at or above 10,000 feet in elevation. An atlas of information **(Table 2)** provides statistics concerning population, land ownership, rainfall, and temperature in Arizona.

Ecoregions – Ecoregions **(Figure 1)** identify areas of relatively homogeneous ecological systems. These areas were delineated on a national scale based on geology, natural vegetation, and soils. Arizona contains portions of five of the 76 ecoregions recognized in the United States (Omernik, 1987).

Ecoregions in Arizona

Arizona/New Mexico Mountains – low to high mountains with grazed forests and woodlands.
Arizona/New Mexico Plateau – tablelands with considerable to very high relief and plains with high mountains. The Plateau is differentiated from the Colorado Plateau by its semi-humid grassland.
Colorado Plateau – tablelands with considerable to very high relief, plains with high mountains, grazed open woodland, and some irrigated agriculture.
Southern Basin and Range – desert valleys with desert shrubland associations, separated by low mountains.
Southern Deserts – desert shrubland associations on desert plains, with abrupt

Hydrologic Provinces – The U.S. Geological Survey has also divided the state into three physiographic and hydrographic provinces based on the occurrence of water, geology, and altitude (Anderson et al., 1992) **(Figure 2)**.

Hydrologic Provinces in Arizona

Basin and Range – broad, gently sloping valleys, separated by sharply rising mountain ranges ("sky islands") receive more precipitation than the desert lowlands (20 inch annual average at Chirichahua National Monument, compared to 4-12 inches annually in the low deserts). The basins are filled with several thousand feet of sediments overlain with stream alluvium. This alluvium forms the most productive aquifers in Arizona, from which approximately 97% of all ground water is pumped (Wilson, 1991). Depths to ground water range from land surface near perennial streams to as much as 1,300 feet below land surface near the mountain front.
Central Highlands – is a geologic and physiographic transition between the other two provinces. The type and distribution of aquifers vary, with alluvial aquifers occupying relatively small basins, aquifers in consolidated sedimentary rocks, and fractured aquifers in hard rocks. Most perennial streams in the state originate in this province, which receives the highest annual precipitation (16-32 inches.)
Plateau Uplands – underlain by extensive consolidated sedimentary rock formations. Most of the ground water in this province is withdrawn from these formations more than 1000 feet deep, although localized alluvial aquifers also provide some ground water. This province has annual precipitation ranging from 10-25 inches. The eastern half is a barren plateau, with isolated alluvial deposits occurring only as narrow strips along large drainages, while the western half (north of the Grand Canyon) is wooded plateaus and mountain peaks which rise higher than 8,000 feet in elevation.

Population – The 2000 census data indicates that most of Arizona's population (60%) is located in the Phoenix metropolitan area. Since 1990 the state's population has increased 40%, with the Phoenix area growing from 2,120,000 to 3,252,000 (45%).

Table 2. Arizona Atlas

Population	5,131,000 people (2000 Census) (40% increase since 1990) Phoenix metro area 3,252,000 (14th largest metro area in the US) Tucson metro area 844,000 Yuma metro area 160,000 Flagstaff metro area 122,366
Surface Area	113,635 square miles
Population Density	45 persons per square mile (US density is 80 persons per square mile)
Land Ownership	28% Indian Lands 17% Bureau of Land Management 17% Individual and Corporate 15% Forest Service 13% State of Arizona 10% Other federal, county, municipal
Elevation Variation	Highest point 12,630 feet above sea level (Humphrey's Peak) Lowest point 70 feet above sea level (near Yuma)
Annual Long-term Average Precipitation[a]	Lowest 3 inches (Yuma) Highest 27 inches (McNary) Phoenix metro 7 inches
Temperature[a]	Average Daily: Highest 88 °F (Yuma) Lowest 45 °F (Flagstaff) Record temperatures: Highest 128 °F (Lake Havasu City) Lowest -40 °F (Hawley Lake)
Average Annual Withdrawal (acre-feet) [b]	Ground Water 4,264,000 acre-feet (1971-1990) Surface Water 2,961,000 acre-feet (1971-1990)
Approximate Acres of Riparian Areas[c]	266,786 acres located on 3,530 miles of perennial streams 165,000 acres located on 10,000 miles of intermittent streams

(a) Arizona Climatological Laboratory, 1994 (verbal communication)

(b) Arizona Department of Water Resources, 1994.

(c) Arizona Game and Fish Department, 1993 (perennial streams), 1997 (intermittent streams).

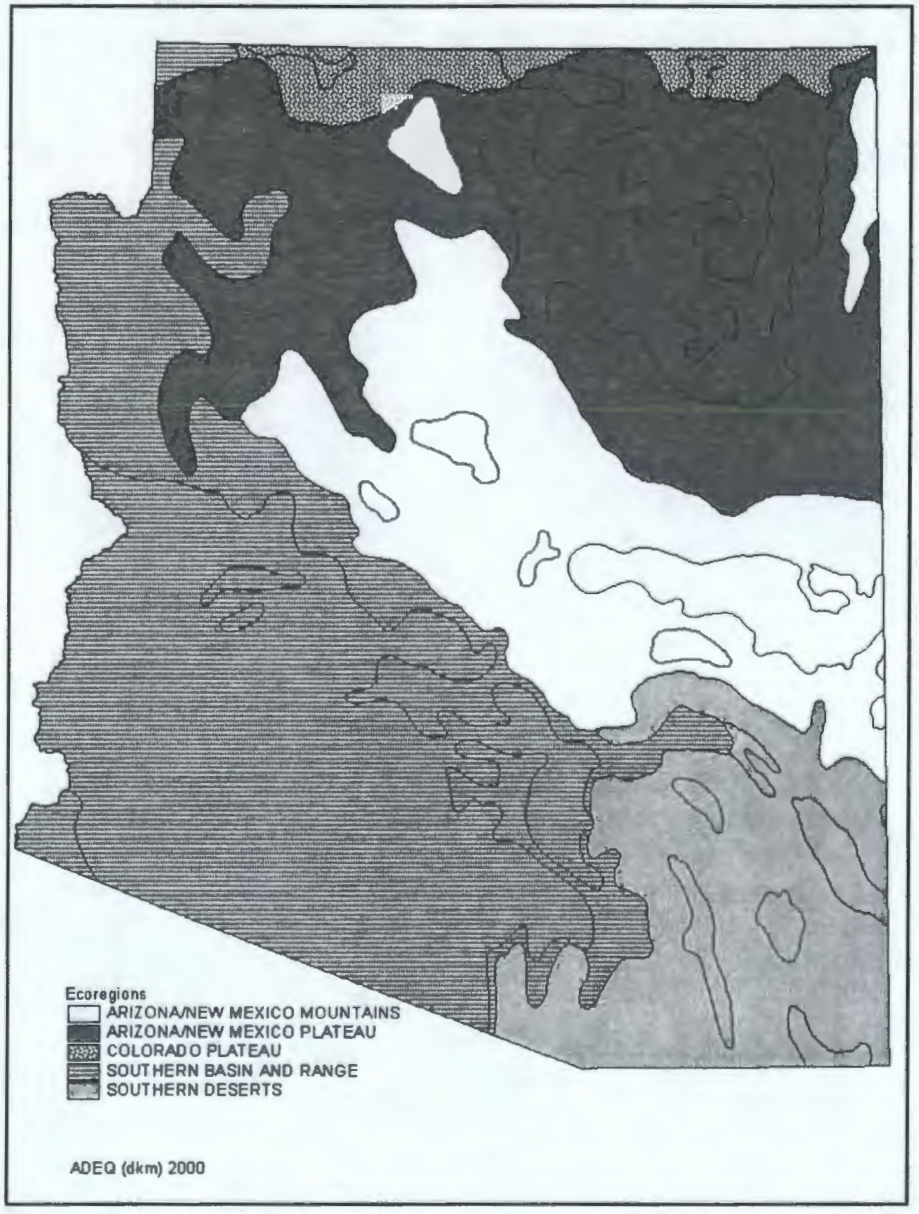


Figure 1. Arizona's Ecoregions

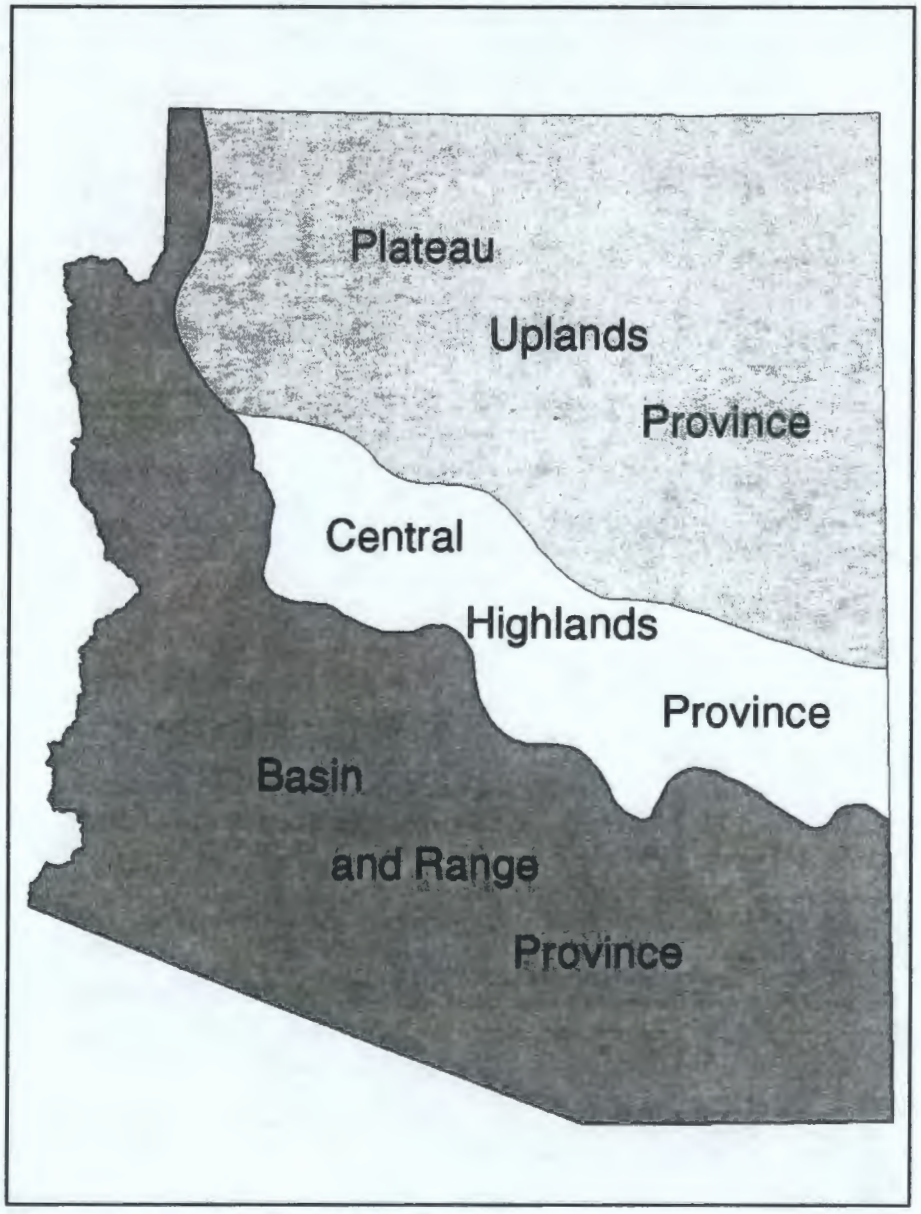


Figure 2. Arizona's Hydrologic Provinces

Land Ownership – Only 17% of the land within Arizona is privately owned, the remainder is owned by federal and state agencies and Indian Nations **(Table 2 and Figure 3)**. Land ownership can suggest land uses. For example, urban areas of population growth are generally restricted to privately owned lands, and irrigated agriculture primarily is associated with private and Indian lands. On the other hand, some activities such as mining and grazing are widespread across all types of ownership.

A significant part of the state (28%) is owned by Indian Nations **(Table 2 and 3)**. Some of the maps in this report indicate where Tribal lands occur. Although waters on Indian lands are not assessed in this report, these waters are an integral part of the state's water resources. Many of the Indian Nations publish their own water quality assessment reports which should be read in conjunction with this report to understand water quality conditions across Arizona.

Hydrologic Flow and Climate– Many of Arizona's streams are not perennial (do not contain water year round), but instead flow only part of the year (intermittent flow), or only in response to precipitation (ephemeral). An estimate of Arizona's water resources is provided in **Table 2**. A map of streams with perennial flow **(Figure 4)** was created based on riparian area research by the Arizona Game and Fish Department (AGFD 1993 and 1997). This map illustrates generalized conditions but more research is needed in most watersheds to accurately depict hydrologic flow conditions.

The ephemeral and intermittent nature of Arizona's streams is largely due to climatic conditions, particularly precipitation and temperature **(Figure 5 and 6)**. However, ground water pumping, diversions into canals, and the creation of reservoirs has also had a significant influence on the amount of water in Arizona's streams.

USGS Stream Flow Classification

Perennial: Flows continuously throughout the year.

Intermittent: Flows only at certain times of the year (i.e., seasonal) when receiving water from springs or from some surface source such as melting snow.

Ephemeral: Flows only in direct response to precipitation and its channel is always above the water table.

Table 3. An Estimate of Arizona's Water Resources

WATERSHED NAME	STREAMS (miles)						LAKES (acres)				Ground water ESTIMATED* STORAGE (acre-feet)
	Non-Indian Land			Indian Land			Non-Indian Land		Indian Land		
	Perennial	Intermittent	Ephemeral	Perennial	Intermittent	Ephemeral	Perennial	Non-perennial	Perennial	Non-perennial	
Bill Williams	185	655	5035	0	0	0	1,832	11,950	0	0	32,500,000
Colorado-Grand Canyon	480	260	14,870	125	5	3,740	68,398	13,412	389	0	509,500,000
Colorado-Lower Gila	375	145	13,545	75	0	535	36,866	0	244	0	272,300,000
Little Colorado-San Juan	640	1,655	9,635	305	170	15,310	16,051	6,831	5,295	118	413,000,000
Middle Gila	165	1,210	5,460	0	10	1,105	10,318	55,748	240	0	222,410,000
Salt	510	1,190	2,785	825	0	4,275	25,544	0	1,858	0	***
San Pedro-Willcox-Yaqui	195	665	6,610	0	0	6,395	1,319	29,471	0	0	112,000,000
Santa Cruz-Magdalena-Sonoyta	85	500	7,245	0	20	35	1,366	0	926	0	176,900,00**
Upper Gila	445	970	6,305	105	50	3,795	2,289	0	9,523	11,119	86,300,000**
Verde	450	2,115	5,990	15	5	230	4,603	3,636	6	0	29,550,000
STATE TOTAL	3,530	9,365	77,460	1,450	260	35,420	168,586	121,046	18,481	11,237	***
	Total on Non-Indian 90,375			Total on Indian 37,130			Total on Non-Indian 289,632		Total on Indian 29,716		
	Total miles in Arizona 127,505						Total acres in Arizona 319,350				

Stream miles and lake acres are based on USGS digitized hydrology at 1:100,000, and have been rounded to the nearest five miles. Reservoir acres along the Colorado River include only the acres within Arizona. Waters include manmade reservoirs and ponds of any size. Ground water estimates of supply come primarily from Arizona Department of Water Resources, with some estimates from US Geological Survey.

Non-perennial lake acres include ephemeral lakes, playas, and storm water retention areas that have been specifically named as a surface water in Arizona's surface water quality standards.

* Estimates to 1200 feet below ground surface (acre-feet).
** Indicates that no estimate is available for one or more ground water basins in the watershed.
*** Indicates insufficient data to make an estimate.

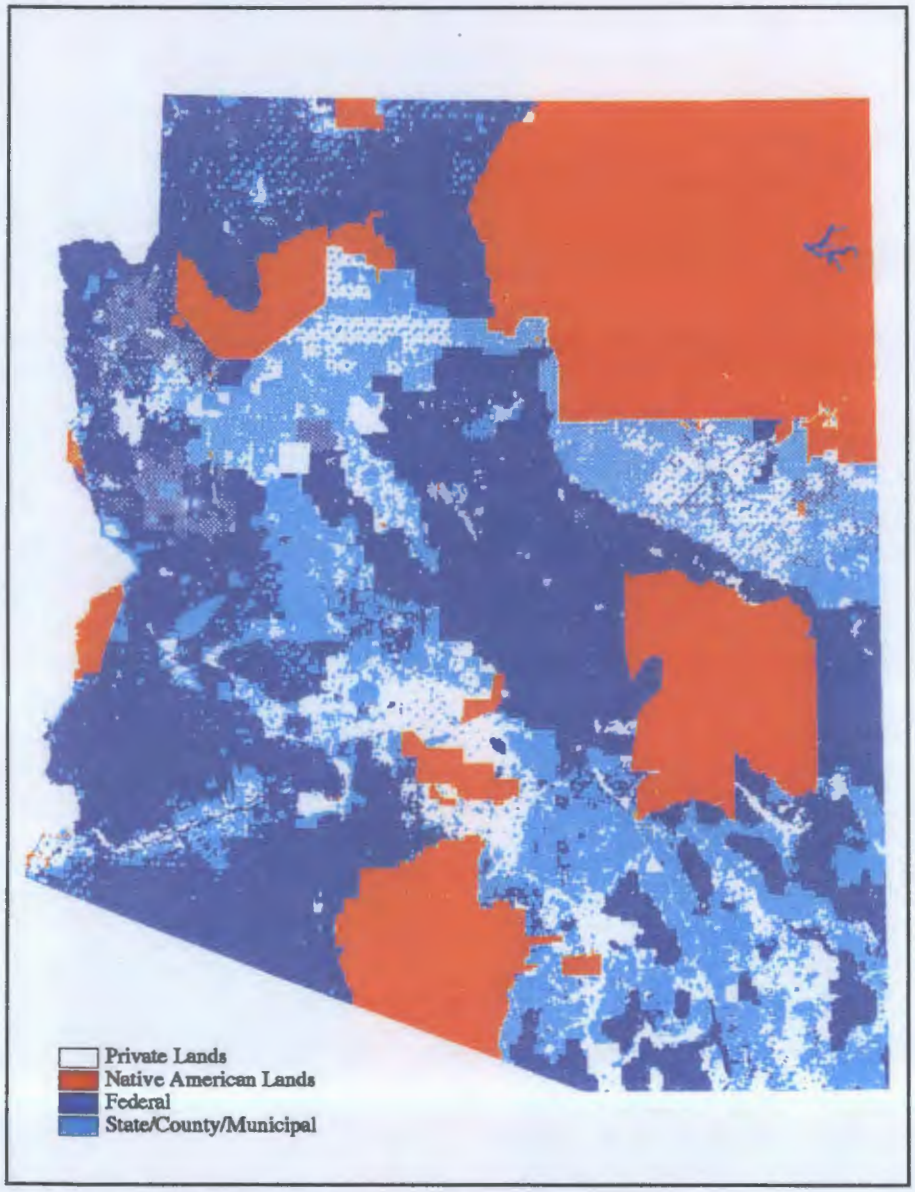


Figure 3. Land Ownership Categories in Arizona

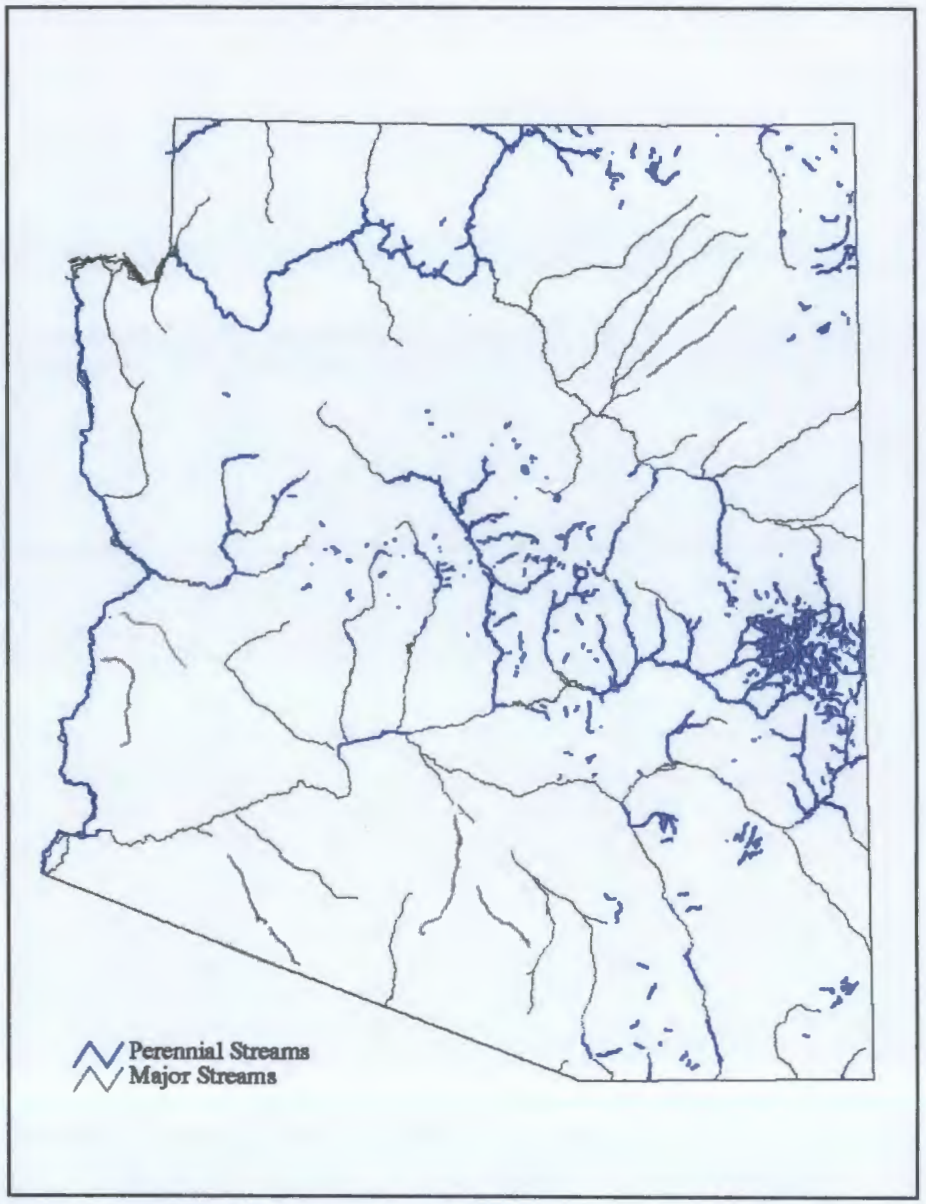


Figure 4. Perennial Streams in Arizona

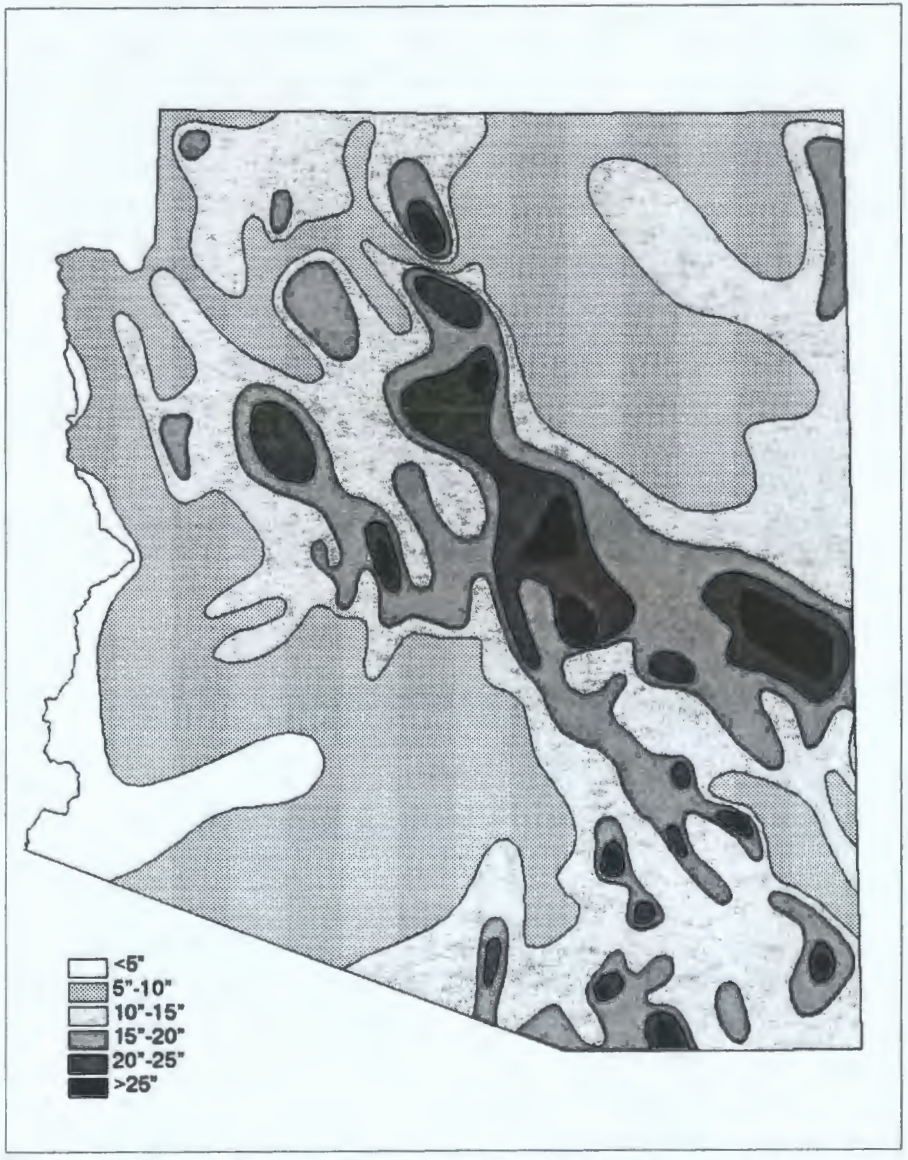


Figure 5. Mean Annual Precipitation Distribution in Arizona

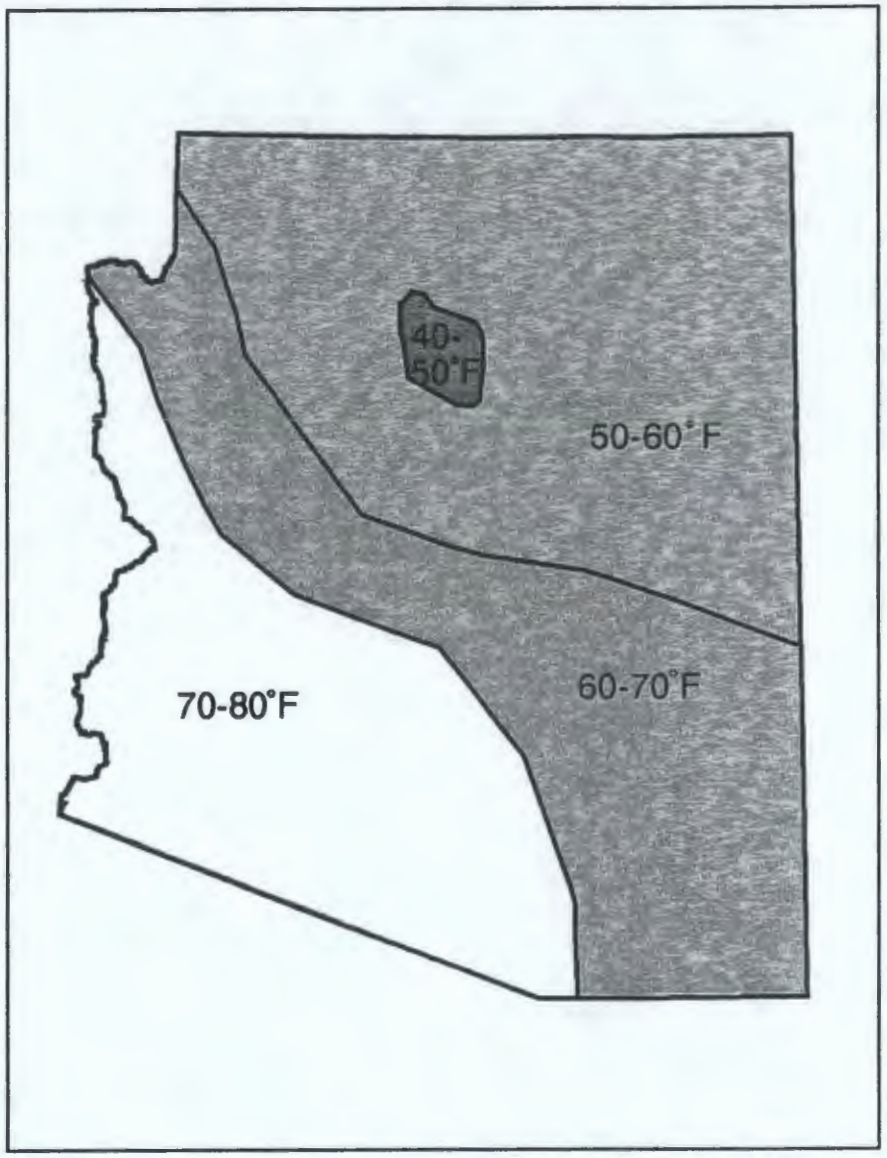


Figure 6. Mean Annual Temperature Distribution in Arizona

Watersheds, hydrologic unit areas, and basins

To manage water quality and quantity concerns, this large and diverse state has been subdivided into surface water hydrologic unit areas, basins, watersheds, ground water basins, and Active Management Areas. These areas are delineated hydrologically rather than politically (e.g., counties, cities, ownership), because water quality and quantity concerns are largely determined by drainage and hydrological flows. Water quality issues do not end at a political boundary.

- **Hydrologic unit areas** – The U.S. Geological Survey divided and subdivided the United States into drainage areas or surface water hydrologic units. Each drainage area was assigned a unique code number, an eight digit Hydrologic Unit Code (HUC) **(Figure 7 and Table 4)**.

> **A HUC divided** -- One HUC (15060106) was divided at Granite Reef Dam because diverting all of the surface water flow from the Salt River into canals makes the western half of this HUC more closely hydrologically interconnected with the Middle Gila Basin than the Salt River Basin.

- **Surface water basins** -- ADEQ grouped the 84 HUCs in Arizona into 13 Surface Water Basins **(Figure 8)** based on hydrologic relationships defined by the HUC numbering system. These surface water basins are used to organize surface waters in Arizona's surface water standards.

- **Watersheds** -- ADEQ also used the HUCs to organize the state into 10 Watersheds **(Figure 9)**. These watersheds were developed to synchronize ADEQ activities within a geographic area such as focused monitoring and surface water permit issuance, and to foster local stakeholder interest and involvement in water quality concerns (see discussion in Chapter III and Volume II). As shown by comparing **Figure 8 and Figure 9,** most Watersheds and Surface Water Basins are similar; however, three watersheds were created by combining basins and one basin (the Colorado River) was split into two watersheds. These new delineations were made to facilitate watershed management group meetings, and considered probable shared water quality concerns, shared land uses, and geographical proximity.

Assessment information throughout this report is organized by watershed to facilitate stakeholder involvement in water quality concerns. However, specific water quality improvement efforts are generally addressed at a smaller drainage or sub-watershed scale.

- **Ground water basins and Active Management Areas** -- ADEQ adopted the ground water basins and Active Management Areas created by the Arizona Department of Water Resources to manage ground water quantity and quality concerns. The delineation of ground water areas was based on physiography, surface drainage patterns, subsurface geology, and aquifer characteristics. These basins do not delineate aquifers in Arizona. Because surface water drainage patterns were considered in delineating ground water basins, most basins fit inside a watershed **(Figure 10).**

Some ground water quality studies and most remedial actions are conducted in a smaller area such as an aquifer or a sub-basin based on sources of contamination.

> **Three Levels of Ground Water Management**
>
> The Arizona Ground Water Management Code administered by the Arizona Department of Water Resources establishes that ground water basins may be classified under two special levels of water quantity management:
> **The Active Management Areas** (AMAs) -- Four ground water basins have been designated as AMAs due to severe overdraft of ground water. The goal in these areas is to achieve "safe-yield" by 2025. The availability of non-ground water supplies to support future growth is an important issue in these areas although ground water will continue to be a necessary part of the water supply.
> **Irrigation Non-Expansion Areas** (INAs) – Irrigation is restricted within these ground water basins.
> **Regional Water Supply Agencies** – These are replenishment districts that are expected to acquire and facilitate delivery of water supplies to reduce ground water overdraft and replenish aquifers.

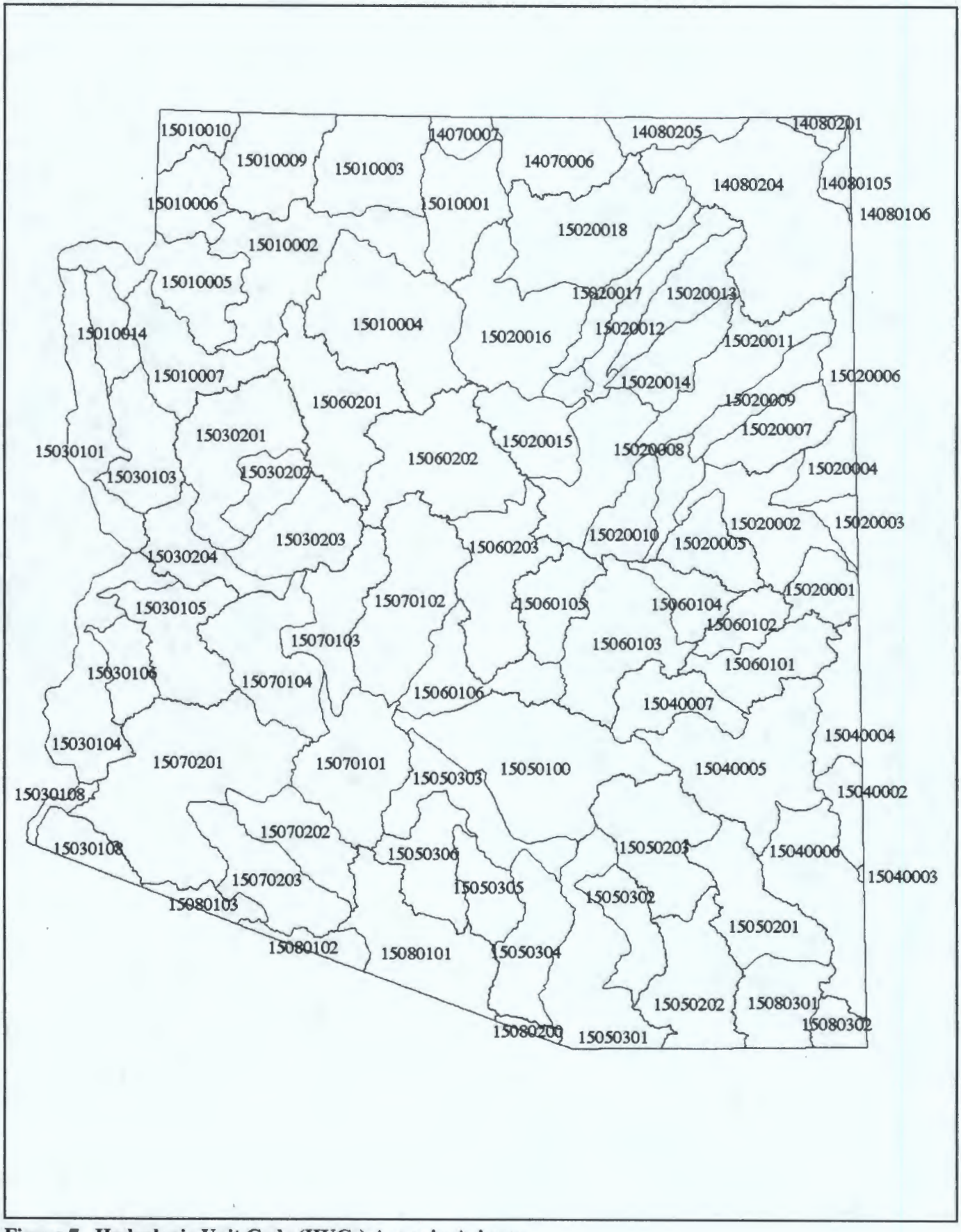


Figure 7. Hydrologic Unit Code (HUCs) Areas in Arizona

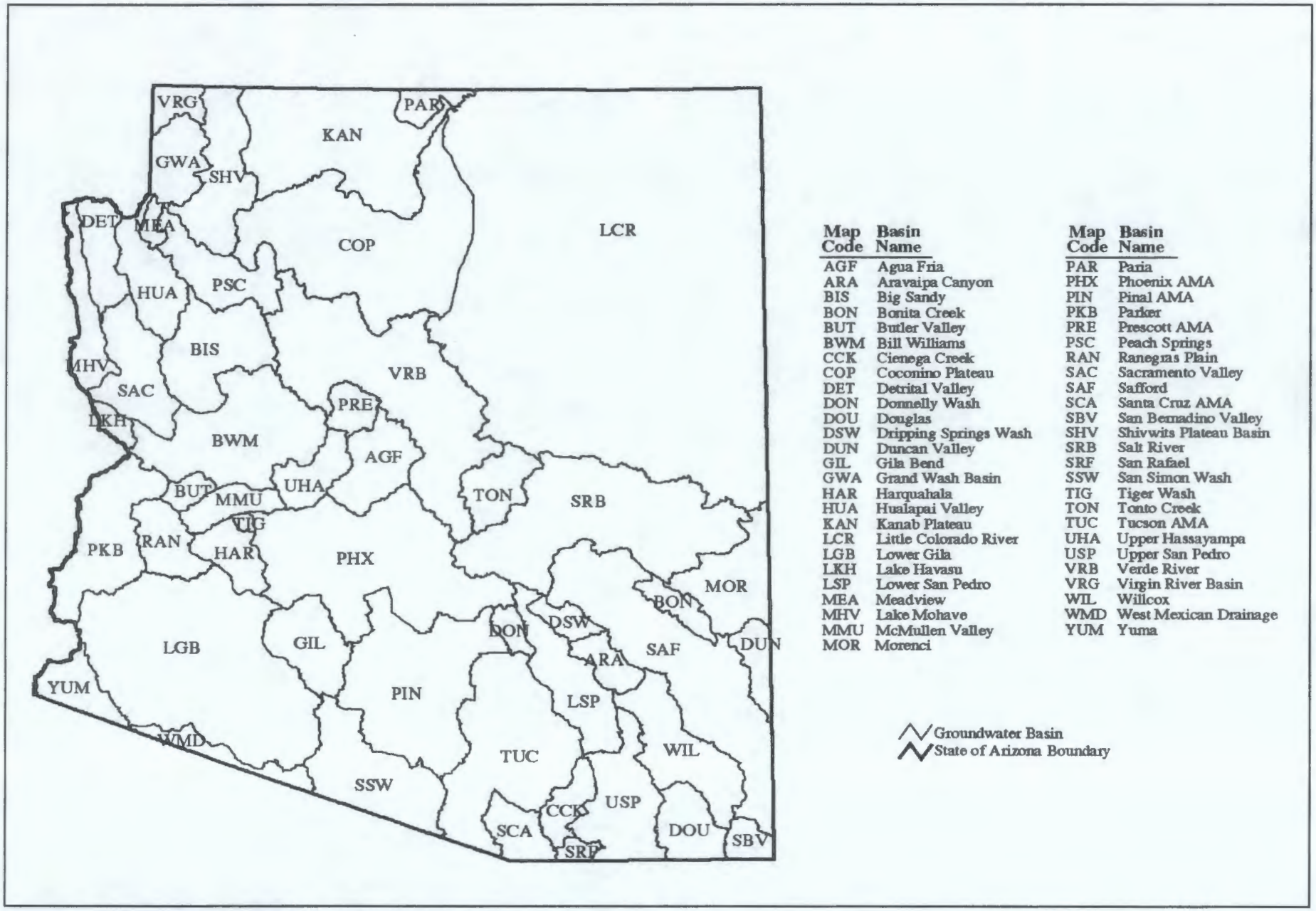
Table 4. Names for the Eight-Digit Hydrologic Unit Code (HUC) Drainage Areas (for Figure 7)

HUC	NAME	WATER	HUC	NAME	WATER	HUC	NAME	WATER	HUC	NAME	W
15030201	Big Sandy	BW	15030108	Colorado (Yuma-Mexico)	CLG	15020014	Jadito Wash	LCR/SJ	15080101	San Simon Wash	SC/RIOS
15030202	Burro Creek	BW	15070201	Lower Gila	CLG	15020015	Diablo Canyon	LCR/SJ	15080102	Sonoyta Valley	SC/RIOS
15030203	Santa Maria River	BW	15070202	Tenmile Wash	CLG	15020016	Moenkopi Wash	LCR/SJ	15080103	Quitobaquito	SC/RIOS
15030204	Alamo Lake-Bill Williams	BW	15070203	San Cristobal	CLG	15020017	Dinnebito Wash	LCR/SJ	15080200	Rio Magdalena	SC/RIOS
14070006	Lake Powell	CGC	14080105	Chaco River	LCR/SJ	15050100	Gila (Coolidge Dam-Salt River)	MG	15050201	Willcox Playa	SP/WP/RY
14070007	Paria River	CGC	14080106	Sansotee Wash	LCR/SJ	15060106B	Salt (below Granite Reef Dam)	MG	15050202	Upper San Pedro	SP/WP/RY
15010001	Marble Canyon	CGC	14080201	San Juan	LCR/SJ	15070101	Gila (Salt River-Painted Rocks Dam)	MG	15050203	Lower San Pedro	SP/WP/RY
15010002	Grand Canyon	CGC	14080204	Chinle Valley	LCR/SJ	15070102	Agua Fria River	MG	15080301	Whitewater Draw	SP/WP/RY
15010003	Kanab Creek	CGC	14080205	Monument Valley	LCR/SJ	15070103	Hassayampa River	MG	15080302	Blackwater Draw	SP/WP/RY
15010004	Havasu Canyon	CGC	15020001	Upper Little Colorado (LCR)	LCR/SJ	15070104	Centennial Wash	MG	15040002	Upper Gila	UG
15010005	Lake Mead	CGC	15020002	LCR (Lyman-Puerco)	LCR/SJ	15060101	Black River	SALT	15040003	Arimas Valley	UG
15010006	Grand Wash	CGC	15020003	Carrizo Wash	LCR/SJ	15060102	White River	SALT	15040004	San Francisco River	UG
15010007	Truxton Wash	CGC	15020004	Zuni River	LCR/SJ	15060103	Roosevelt Lake	SALT	15040005	Gila Valley	UG
15010009	Fort Pierce Wash	CGC	15020005	Silver Creek	LCR/SJ	15060104	Carrizo Creek	SALT	15040006	San Simon Creek	UG
15010010	Virgin River	CGC	15020006	Upper Puerco River	LCR/SJ	15060105	Tonto Creek	SALT	15040007	San Carlos River	UG
15010014	Detrital Wash	CGC	15020007	Lower Puerco River	LCR/SJ	15060106A	Salt River (Roosevelt-Granite Reef)	SALT	15060201	Chino Valley	VD
15030101	Colorado (Hoover-Parker Dam)	CLG	15020008	LCR (Puerco-Dinnebito)	LCR/SJ	15050301	Upper Santa Cruz	SC/RIOS	15060202	Verde Valley	VD
15030103	Sacramento Wash	CLG	15020009	Leroux Wash	LCR/SJ	15050302	Pantano Wash	SC/RIOS	15060203	Lower Verde River	VD
15030104	Colorado (Parker-Imperial Dam)	CLG	15020010	Chevelon Canyon	LCR/SJ	15050303	Lower Santa Cruz	SC/RIOS			
15030105	Bouse Wash	CLG	15020011	Pueblo Colorado	LCR/SJ	15050304	Altar and Avra Valleys	SC/RIOS			
15030106	Tyson Wash	CLG	15020012	Orabi Wash	LCR/SJ	15050305	Aquirre Valley	SC/RIOS			
15030107	Colorado (Imperial-Yuma)	CLG	15020013	Polacca Wash	LCR/SJ	15050306	Santa Rosa Wash	SC/RIOS			

WATER = Watersheds; BW = Bill Williams, CGC = Colorado Grand Canyon, CLG = Colorado-Lower Gila, LCR/SJ = Little Colorado-San Juan, MG = Middle Gila, SALT = Salt, SC/RIOS = Santa Cruz-Rio Magdalena-Rio Sonoyta, SP/WP/RY = San Pedro-Willcox Playa-Rio Yaqui, UG = Upper Gila, VD = Verde

Figure 8. Arizona's Surface Water Basins

Figure 9. Arizona's Watersheds



Map Code	Basin Name
AGF	Agua Fria
ARA	Aravaipa Canyon
BIS	Big Sandy
BON	Bonita Creek
BUT	Butler Valley
BWM	Bill Williams
CCK	Cienega Creek
COP	Coconino Plateau
DET	Detrital Valley
DON	Donnelly Wash
DOU	Douglas
DSW	Dripping Springs Wash
DUN	Duncan Valley
GIL	Gila Bend
GWA	Grand Wash Basin
HAR	Harquahala
HUA	Hualapai Valley
KAN	Kanab Plateau
LCR	Little Colorado River
LGB	Lower Gila
LKH	Lake Havasu
LSP	Lower San Pedro
MEA	Meadview
MHV	Lake Mohave
MMU	McMullen Valley
MOR	Morenci

Map Code	Basin Name
PAR	Paria
PHX	Phoenix AMA
PIN	Pinal AMA
PKB	Parker
PRE	Prescott AMA
PSC	Peach Springs
RAN	Ranegras Plain
SAC	Sacramento Valley
SAF	Safford
SCA	Santa Cruz AMA
SBV	San Bernadino Valley
SHV	Shivwits Plateau Basin
SRB	Salt River
SRF	San Rafael
SSW	San Simon Wash
TIG	Tiger Wash
TON	Tonto Creek
TUC	Tucson AMA
UHA	Upper Hassayampa
USP	Upper San Pedro
VRB	Verde River
VRG	Virgin River Basin
WIL	Willcox
WMD	West Mexican Drainage
YUM	Yuma

Groundwater Basin
State of Arizona Boundary

Figure 10. Ground Water Basins in Arizona

III. How are Water Quality Assessments Performed?

Do all waters have to meet the same standards?

Standards and Designated Uses -- Arizona sets narrative and numeric surface water standards for water quality based on the uses people and wildlife make of the water. These "designated uses" are specified in the standards for individual surface waters, or if the surface water is not listed in the rule, the designated uses are determined by the tributary rule, based on the most likely uses including downstream uses. Surface waters have multiple designated uses, while aquifers are protected for drinking water use, unless specifically reclassified. Water quality is judged acceptable or impaired based on standards established to protect each designated use.

Surface water standards are reviewed and revised on a three-year cycle. These standards are established in Arizona Administrative Code (A.A.C.) R18-11-101 through R18-11-123 plus appendices. Ground water standards (A.A.C. R18-11-401 through R18-11-506) are revised as new drinking water protection standards are adopted. The numeric surface water quality standards adopted in 1996 were used in this assessment, although new surface water standards may be adopted and approved by EPA before this report is published, they were not in effect when the assessment was made. The surface and ground water quality standards used in this assessment are included in **Appendix C**.

Designated Use Classification -- Six groups of designated uses can be applied to surface waters. All bodies of water regulated by these standards (except canals) are protected for aquatic and wildlife uses and recreation in or on the water (either Full Body and Fish Consumption or Partial Body Contact).

- **Aquatic and Wildlife**. Four categories of aquatic and wildlife protection have been established. All surface waters, except canals, have one of these:
  - Warmwater aquatic community (A&Ww),
  - Coldwater aquatic community (A&Wc),
  - Effluent dependent water (A&Wedw),
  - Ephemeral flow (A&We).

  Aquatic and Wildlife criteria are also divided into acute criteria (established based on short exposures) and chronic criteria (established based on long-term or life-time exposures.)

- **Full Body Contact** (FBC) or **Partial Body Contact** (PBC) criteria were established to maintain and protect water quality for swimming, water skiing, boating, and wading. The FBC criteria are to protect public health when people engage in full immersion in the water and potential ingestion. The PBC criteria are to protect people who engage in water-based recreation where full immersion and ingestion of the water are unlikely (wading, fishing, boating).

- **Fish Consumption** (FC) water quality criteria were established to protect human health from pollutants which may bioaccumulate in aquatic organisms (e.g., fish, turtles, crayfish) and be consumed by people.

- **Domestic Water Source** (DWS) criteria are applied to surface water that is used as a raw water source for drinking water supply. The criteria were developed assuming that conventional water treatment (disinfection and filtration) would be needed to yield water suitable for human consumption.

- **Agriculture Irrigation** (AgI) criteria were established to protect water used for irrigating crops.

- **Agriculture Livestock Watering** (AgL) criteria were established to safeguard water used for consumption by livestock.

Narrative standards -- Narrative surface water standards (A.A.C. R18-11-108) were established to protect water quality when a numeric standard is not available or is insufficient **(Appendix C)**. The new state TMDL statute requires development of narrative implementation procedures before narrative standards can be applied to 303(d) listing decisions. These documents are under development but were not available for this assessment.

Narrative aquifer water quality standards also exist to protect ground water quality. These standards similarly prohibit discharges that would cause or contribute to a pollutant being present (A.A.C. R18-11-405) **(Appendix C)**.

Do some waters have special standards to meet?

Unique Waters Classification and Antidegradation Standards – A Unique Water is a surface water classified by ADEQ as an outstanding state resource water (as prescribed in A.A.C. R18-11-112). Twenty streams have been established as Unique Waters in Arizona **(Figure 11)**.

ADEQ may classify a surface water as a unique water through the rule making process if it meets one of the following criteria:

- The surface water is of exceptional recreational or ecological significance because of its unique attributes, including but not limited to attributes related to the geology, flora, fauna, water quality, aesthetic values, or wilderness characteristics of the surface water, or
- Threatened or endangered species are known to be associated with the surface water and existing water quality is essential to the maintenance and propagation of a threatened or endangered species, or the surface water provides critical habitat for a threatened or endangered species.

Public comments in support or opposition to a Unique Waters nomination are considered by the Department in making the decision on classifying a water as meeting one or both of these criteria.

Unique waters are given more stringent surface water quality protections than other surface waters under the state's antidegradation rule A.A.C. R18-11-107(D). Under antidegradation implementation procedures, activities that may result in a new or expanded discharge of pollutants to Unique Water (or its tributaries) are prohibited if the discharge would cause degradation of existing water quality. Discharges include those caused by land use activity (e.g., construction, mining, grazing, agriculture) as well as discharges requiring a surface water discharge permit (e.g., wastewater treatment plant discharge, adit, dredge and fill activity).

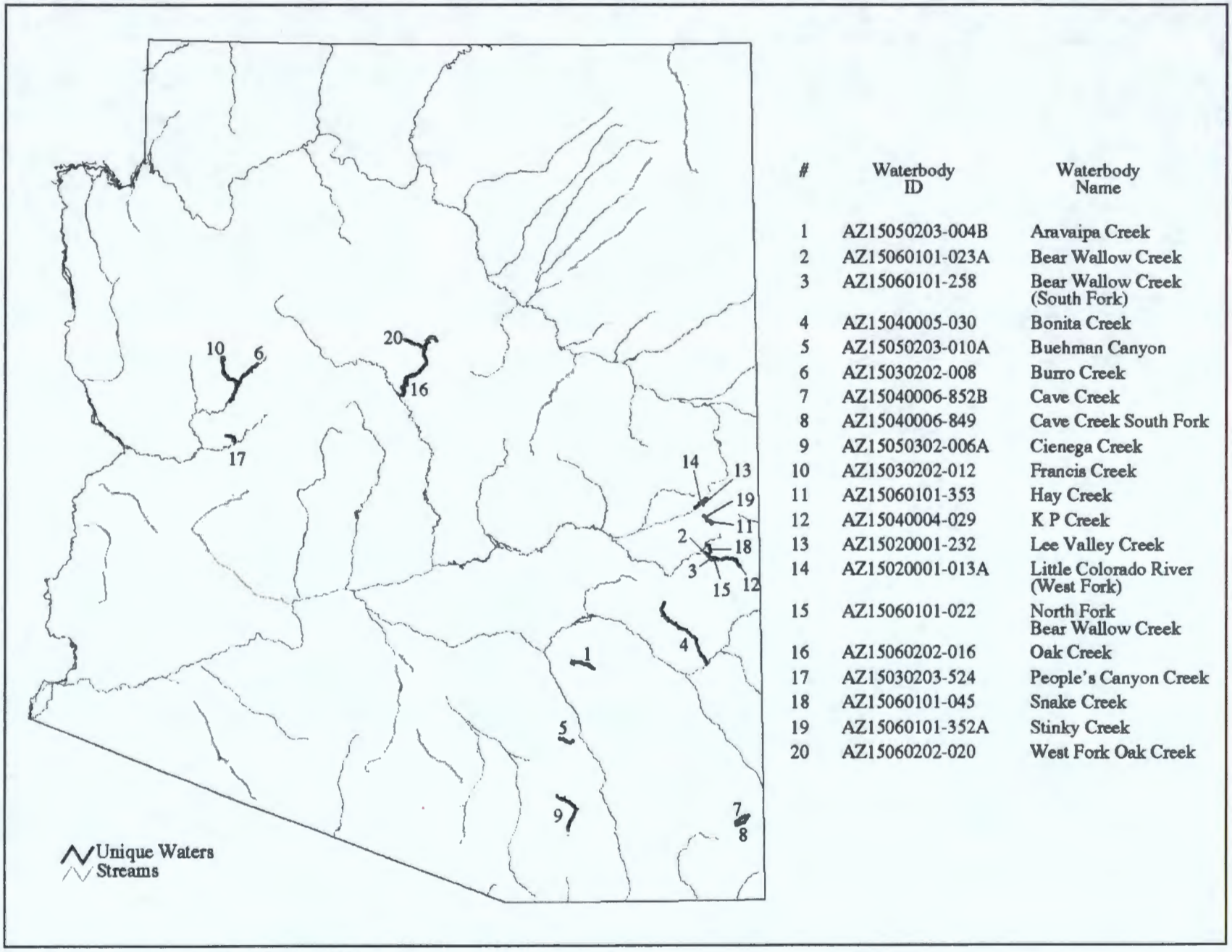
Additional, more stringent, numeric standards can be specified for Unique Waters. These site specific standards are listed in the surface water standards (A.A.C. R18-11-112).

Effluent Dependent Water – ADEQ classifies some waters as effluent dependent waters **(Figure 12)**. These surface waters would generally be ephemeral, except for the discharge of treated effluent. Designated uses are limited to Aquatic and Wildlife effluent dependent water, Partial Body Contact, and in some places Agriculture Livestock Watering.

Arizona has developed specific Aquatic and Wildlife effluent dependent water (A&Wedw) standards for bacteria, water temperature, dissolved oxygen, and acute and chronic toxic chemical criteria **(Appendix C)**. In general these standards are less stringent than other Aquatic and Wildlife designated uses, the exception being fecal coliform that is more stringent because of the likelihood of pathogens in wastewater.

Moderating Provisions – Dischargers have had the opportunity to establish a "mixing zone," "nutrient waiver," or "variance" through the NPDES/AZPDES permit process. These moderating provisions provide an alternate standard on the surface water.

- A mixing zone is a prescribed area or volume of surface water where initial dilution of the discharge takes place. A mixing zone can only be established if there is adequate water for dilution; therefore it cannot be applied to an ephemeral drainage.
- A nutrient waiver can be established (for total phosphorus or total nitrogen) for a discharge to an ephemeral water which is a tributary to a surface water with nutrient standards, if there is evidence that the downstream water does not have excessive algae, aquatic plants, or other indications of excessive nutrient loading due to the discharge.
- ADEQ can also grant a pollutant specific variance for a point source discharge for up to five years where:
  1. The permittee demonstrates that the treatment is more advanced than the technology-based effluent limitations needed to comply with the water quality standards, but
  2. It is not technically feasible to achieve this level of treatment within the next five years, or the cost of such treatment would result in unacceptable social and economic impacts.



#	Waterbody ID	Waterbody Name
1	AZ15050203-004B	Aravaipa Creek
2	AZ15060101-023A	Bear Wallow Creek
3	AZ15060101-258	Bear Wallow Creek (South Fork)
4	AZ15040005-030	Bonita Creek
5	AZ15050203-010A	Buehman Canyon
6	AZ15030202-008	Burro Creek
7	AZ15040006-852B	Cave Creek
8	AZ15040006-849	Cave Creek South Fork
9	AZ15050302-006A	Cienega Creek
10	AZ15030202-012	Francis Creek
11	AZ15060101-353	Hay Creek
12	AZ15040004-029	K P Creek
13	AZ15020001-232	Lee Valley Creek
14	AZ15020001-013A	Little Colorado River (West Fork)
15	AZ15060101-022	North Fork Bear Wallow Creek
16	AZ15060202-016	Oak Creek
17	AZ15030203-524	People's Canyon Creek
18	AZ15060101-045	Snake Creek
19	AZ15060101-352A	Stinky Creek
20	AZ15060202-020	West Fork Oak Creek

Figure 11. Unique Waters in Arizona – 2002

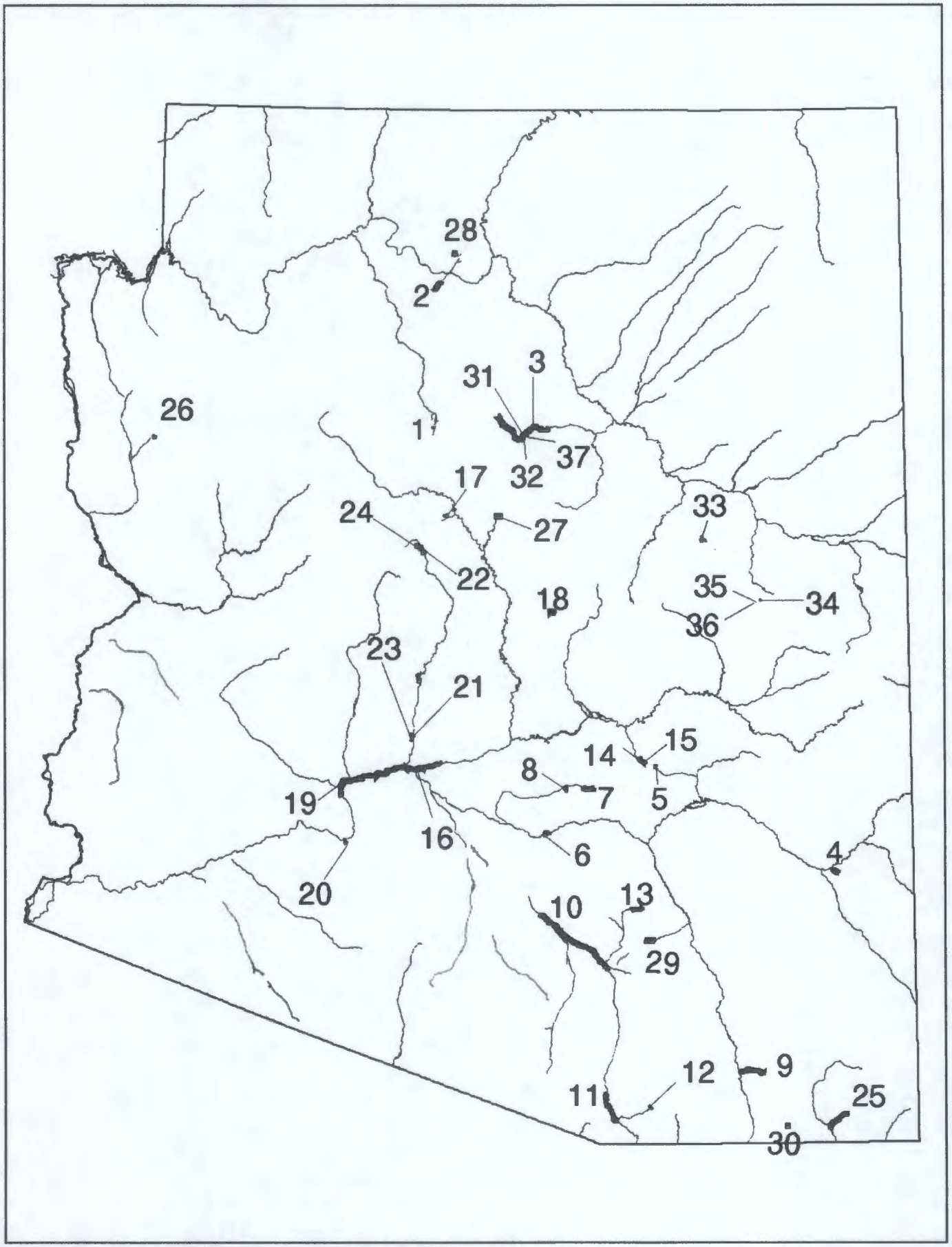


Figure 12. Effluent Dependent Waters in Arizona

Effluent Dependent Waters – Table for Figure 12

Map #	Surface Water Name and Wastewater Treatment Plant (WWTP)		Map #	Surface Water Name and Wastewater Treatment Plant (WWTP)
1	Cataract Creek below Williams WWTP		21	Agua Fria River below El Mirage WWTP
2	Bright Angel Wash below So Rim of Grand Canyon WWTP		22	Agua Fria River below #24 (Prescott Valley WWTP)
3	Rio de Flag below Flagstaff WWTP		23	Unnamed wash to Luke Air Force Base WWTP
4	Bennet Wash below ADOC*-Safford WWTP		24	Unnamed wash to Agua Fria below Prescott Valley WWTP
5	Unnamed wash below ADOC*-Globe WWTP		25	Unnamed wash to Whitewater Draw (Bisbee Airport WWTP)
6	Gila River below Florence WWTP		26	Holy Moses Wash below Kingman WWTP
7	Queen Creek below Superior WWTP		27	Jack's Canyon Wash below Big Park WWTP
8	Unnamed wash below Queen Valley WWTP		28	Transept Canyon below No. Rim Grand Canyon WWTP
9	Walnut Gulch below Tombstone WWTP		29	Unnamed tributary to Alder Wash below Mount Lemon WWTP
10	Santa Cruz River below Pima County Roger Road WWTP		30	Mule Gulch below Bisbee WWTP
11	Santa Cruz River below Nogales International WWTP		31	Lake Humphreys from Flagstaff WWTP
12	Sonoita Creek below Patagonia WWTP		32	Wale Lake from Flagstaff WWTP
13	Unnamed wash below Oracle WWTP		33	Dry Lake from Stone Container WWTP
14	Pinal Creek below #15 (Globe WWTP)		34	Pintail Lake from Show Low WWTP
15	Unnamed wash below Globe WWTP		35	Telephone Lake from Show Low WWTP
16	Salt River below Phoenix 23rd Avenue WWTP (Phoenix metro WWTPs)		36	Ned Lake from Show Low WWTP
17	Bitter Creek below Jerome WWTP		37	Lower Walnut Canyon Lake from Flagstaff WWTP
18	American Gulch below the No. Gila County WWTP		38	Lake Cochise
19	Gila River below #16 to Gillespie Dam (Phoenix metro WWTPs)			
20	Unnamed wash from Gila Bend WWTP			

* ADOC = Arizona Department of Corrections

How does ADEQ assess a surface water?

In assessing surface water quality there is always a risk of concluding that a surface water is impaired when it is not, or concluding that a surface water is attaining its uses when it is actually impaired. Either of these errors involves a cost. Concluding that a surface water is impaired when it is not, results in a use of resources that should be utilized elsewhere. Concluding that a surface water is not impaired when it actually is, results in not addressing existing environmental degradation and human health threats. To reduce the risk of either of these errors, the assessment process has been modified since the last assessment.

Generalized Assessment Process -- A surface water is assessed based on all readily available, credible, and scientifically defensible monitoring data and information pertaining to possible numeric and narrative standards violations. Each designated use is assessed, then these assessments are combined to provide an overall water quality assessment and to determine whether the Department needs to take further actions.

The rest of this section describes the details of this process.

Data Collection and Review – For this assessment, ADEQ reviewed all readily available surface water quality data collected during the five-year period beginning October 1995. Data was requested from all federal and state agencies who routinely collect water quality data, including water chemistry, sediment contamination, bioassessments, fish tissue, fish kills, weed harvesting, physical habitat information. EPA's STORET database was queried. (STORET is EPA's storage and retrieval system for housing surface water data from federal and state agencies.) The assessment team also made an effort to track down all surface water quality data collected through permit compliance, remediation, and enforcement programs within this agency, from universities, and from volunteer monitoring programs.

All data obtained was reviewed to determine whether it met the requirements in the new Impaired Waters Rule (A.A.C. R18-11-602 and 603, see **Appendix B**) for being credible, scientifically defensible, and representative. These requirements can be summarized as:

- Data must be collected and analyzed using an appropriate Quality Assurance Plan and Sampling Analysis Plan, and using field and laboratory methods by adequately trained personnel.
- Data must be evaluated to determine whether it is reliable, representative of current water quality conditions, and valid by considering factors such as: laboratory detection limits, equipment tolerances, outliers which may indicate laboratory or transcription errors, representativeness of the sampling location, seasonal distribution of the samples, age of the data, and quality control of the data when collected and analyzed.

Data Conflicts and Weight-of-evidence Assessments – Assessment monitoring considers multiple environmental indicators. Each type of data (e.g., biological, toxicological, physical, and chemical) provides its own insights into the integrity and health of an aquatic system and the ability of the public to safely recreate in or use such waters. Each type of data also has different strengths and limitations. For example, chemical water samples generally evaluate and predict impacts from single pollutants, but do not capture the combined interactions of pollutants or cumulative impacts over time. Some chemicals may be found in high levels in fish tissue or sediments while available laboratory methods cannot detect their presence in the water column.

To make an assessment, apparent data conflicts must be resolved. Arizona uses a "weight-of -evidence" approach in completing assessments. The strengths and limitations of each data set are considered, looking at all of the data and exceedances in context with relevant information such as soil type, geology, hydrology, flow regime, geomorphology, natural processes, potential anthropomorphic influences, characteristics of the stressors, age of the data, monitoring techniques, sampling plan, and climate.

Although multiple lines of evidence are desirable, only one line of water quality evidence may be sufficient to demonstrate that the surface water or segment is impaired or not attaining its uses.

Data or information collected during critical conditions may be considered separately from the complete dataset. A surface water may be impaired only during critical conditions such as high or low stream flow, weather conditions, or anthropogenic activities in the watershed, even though it is attaining standards during all other conditions.

Assessment Criteria

Most of Arizona's assessments are based on numeric water chemistry data. To determine whether there is sufficient data and that the data is representative of the surface water being assessed, the following attributes must be considered: core parametric coverage, number of samples, number of sampling events, seasonal distribution of samples, and sample locations. The criteria for having sufficient data are described in the following paragraphs.

Spatial and Temporal Considerations – To determine whether there are sufficient samples and sampling events to support an assessment, first it must be determined that the samples are spatially and temporally independent. Samples are spatially independent if they are collected more than 200 meters apart; or if collected less than 200 meters apart, samples were taken to characterize the effect of an intervening tributary, outfall, pollution source, or significant hydrographic or hydrologic change. Samples are temporally independent if they are collected at the same location but more than seven (7) days apart.

If samples are not spatially or temporally independent (e.g., samples taken at different depths in a lake), the data will be represented by a calculated value. The method for calculating these values varies by type of surface water standard. If the standard was established to protect from immediate or acute impacts, then a maximum or worst case value for the data set is used. Examples of standards developed for acute exposures include: dissolved metals, chlorine, dissolved oxygen, and acute ammonia. However, if the standard was developed based on concern for lifetime or long-term exposure, then an appropriate measure of central tendency (e.g., mean, median, geometric mean) is used. Most standards to protect uses for fishing, drinking, fish consumption, and agricultural uses fall into this second category.

Assessment Categories – As shown in the assessment process diagram **(Figure 13)**, the number of exceedances, samples, seasonal distribution, and other assessment factors required for an assessment vary. The following criteria are applied to assess a surface water. First individual designated uses are assessed. Then the entire reach or lake is assessed by combining the individual assessments.

- **Attaining** -- To assess a designated use as "attaining," the following minimum data requirements must be met:

  - Samples collected:
    1. Represent at least three spatially and temporally independent sampling events;
    2. Represent multiple seasons, or if limited periods of flow (ephemeral or intermittent), samples are collected across multiple years; and
    3. Include core parameters for each designated use (**Table 5**);
  - Number of exceedances:
    1. No numeric standards were exceeded and no evidence that a narrative standard was violated; or
    2. Exceedance was due to an activity specifically exempted in surface water standards (see following discussion of exempted exceedances); or
    3. If any numeric standards were exceeded, there are:
       a. 10 or more spatially independent samples,
       b. Collected during three (3) or more temporally independent sampling events, and
       c. Fewer exceedances than required for addition to the Planning List based on Table 1 in the Impaired Waters Rule (see **Appendix B**).

Surface waters are assessed as "attaining" their uses fall into three categories:

- **Attaining All Uses** – All designated uses were assessed as "attaining."

- **Attaining Some Uses** – At least one designated use was assessed as "attaining" and all other uses were assessed as "inconclusive" (see "inconclusive" criteria below). These waters are added to the Planning List for further monitoring.

- **Threatened** – A use would be assessed as "attaining" except that a trend analysis indicates that a standard may be exceeded before the next assessment. These surface waters are added to the Planning List for further monitoring.

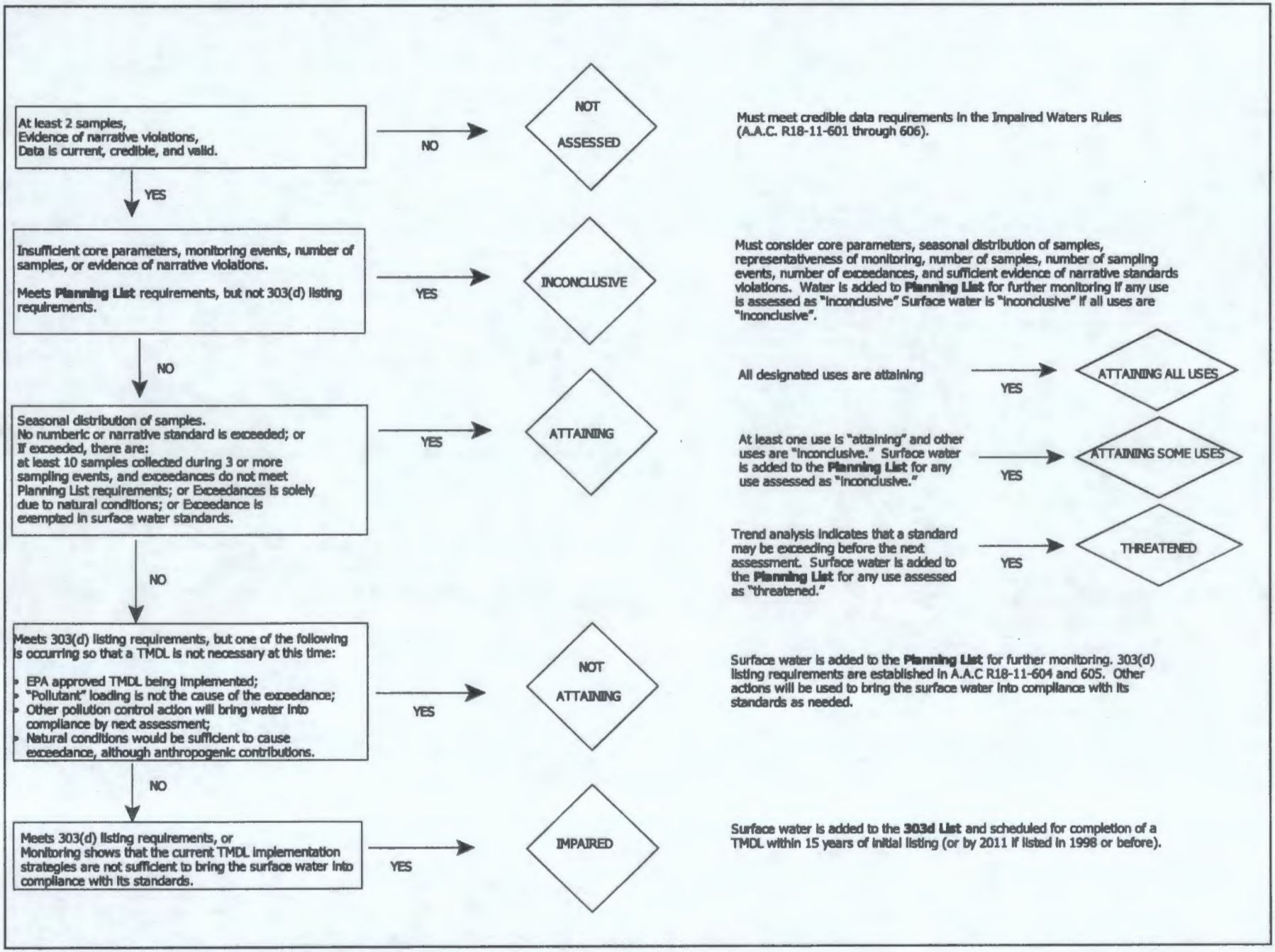


Figure 13. 2002 Assessment Process Diagram

- **Impaired and Not Attaining** – The exceedance is recurring, persistent, or occurring under critical conditions. The Impaired Waters Identification Rules **(Appendix B)** establishes the following criteria:

Impaired – A designated use is "impaired" if any of the following occur:

- At least 20 samples were collected during three (3) or more sampling events and the minimum number of samples exceeded a standard, as established in the Impaired Waters Rules Table 2. This table starts with a minimum of five (5) exceedances among 20 samples. (These numbers were calculated to provide a 90% statistical confidence that a standard is exceeded at least 10% of the time), or
- An acutely toxic pollutant exceeded its surface water quality standard more than once in a three-year period. Acutely toxic pollutants include the following surface water standards:
  1. Aquatic and wildlife acute toxic standards;
  2. Nitrate or nitrate/nitrite standards; and
  3. Single sample maximum standards for bacteria; or
- More than one exceedance of the following statistically-based criteria in surface water standards:
  1. An annual mean or 90th percentile for nutrients.
  2. 30-day geometric mean for bacteria; or
  3. Aquatic and wildlife chronic criteria.

If one or more designated use is "impaired," the surface water is listed as "impaired," included on the 303(d) List, and scheduled for completion of a TMDL for the listed pollutant.

Not attaining – A designated use has been assessed as "impaired" except that one of the following is occurring so that the preparation of a TMDL is not appropriate:

- A TMDL has been prepared, approved by EPA, and is in the strategy implementation and effectiveness monitoring phase; (Note that if the monitoring shows that the strategies chosen are ineffective at bringing the surface water into compliance with its standards, the surface water will be placed back on the 303(d) List) or
- The surface water is expected to attain its designated uses by the next assessment as a result of pollution control programs under local, state, or federal authority, and evidence of such actions are carefully documented; or
- Investigations have shown that impairment is not caused by a "pollutant" loading, but is classified more generally as "pollution." For example, physical limitations such as the shallowness of the lake are causing the low dissolved oxygen and high pH levels rather than nutrient loadings or nutrient cycling. In such cases, a loading calculation such as a TMDL might not be as relevant as development of site-specific standards or a use attainability analysis.

If any designated use is assessed as "not attaining," the surface water is added to the Planning List for further monitoring. The surface is listed as "not attaining" if any designated use is "not attaining" and no uses are "impaired."

- **Inconclusive** – A designated use is assessed as "inconclusive" when some surface water monitoring data exists but it is insufficient to make an assessment of "impaired," "not attaining," or "attaining." This assessment is used when any of the following occurs:

- There are sufficient exceedances of water quality standards to be placed on the Planning List but insufficient exceedances to be placed on the 303(d) List;
  1. Based on frequency of exceedance, if:
     a. 10 or more spatially independent samples,
     b. Collected during three (3) or more temporally independent sampling events, and
     c. Exceedances equal to or greater than the Planning List Table 1, but insufficient samples or exceedances for 303(d) List Table 2 (see **Appendix B**);
  2. If fewer than 10 spatially independent samples and three (3) or more exceedances of any of the following standards:
     a. Appendix A, Table 1, except for nitrate or nitrate-nitrite, established to protect for swimming, drinking, eating aquatic life, or agriculture;
     b. Water temperature, turbidity, radiochemicals, dissolved oxygen, pH, or single sample maximums for nutrients in A.A.C. R18-11-109; or
     c. Unique water single sample maximum standards (except chromium) in A.A.C. R18-11-112;
  3. An exceedance has occurred, but insufficient frequency of

exceedance to merit assessing as "impaired" (see earlier criteria), and not enough samples or sampling events to determine that it is "attaining" (see earlier criteria);

- Insufficient core parameters, seasonal representation, or other information needed to assess (see criteria for "attaining");
- The surface water was on the 303(d) List in 1998, but was delisted because of:
  1. Insufficient current credible data to determine that the surface water is impaired (see "impaired" criteria); and
  2. Original data does not meet the "impaired" waters requirements; or
  3. The surface water no longer meets the criteria for impairment based on a change in the applicable surface water quality standard or a designated use approved by EPA, and there is insufficient current or original data to determine whether the surface water meets current surface water quality standards. (This did not occur in this assessment.)
- Some evidence of a narrative standard violation exists. For this assessment, evidence of narrative standards violations included: fish kills, fish consumption advisories, swimming area closures, and excessive weed growth combined with indications that pH and dissolved oxygen may not be attaining standards. (For this assessment, no surface waters were placed on the 303(d) List based solely on narrative standards violations as ADEQ is still developing suitable narrative implementation procedures for determining that the surface water is "impaired" and belongs on the 303(d) List.)

If any use is "inconclusive," the surface water is added to the Planning List for additional monitoring and investigation. The surface water is assessed as "inconclusive" if all of its designated uses are assessed as "inconclusive."

- **Not assessed** – A number of surface waters in the state were not assessed due to a lack of monitoring data. Only those with some monitoring data or information about narrative standards violations appear on the monitoring and assessment tables. Surface waters would not be assessed if any of the following occurs:
  - No monitoring data, only one sample collected, or no standards established for data collected (e.g., total dissolved solids) and no evidence of narrative standards violations; or
  - Data does not meet credible data requirements established in the Impaired Waters Identification rule (A.A.C. R18-11-602, see **Appendix B**) (e.g., lacking a quality assurance plan or sampling analysis plan, or sampling techniques not appropriate, holding times not met).

Core Parametric Coverage – Although all parameters with numeric standards are used for this assessment; a core set of parameters was established for each designated use (**Table 5**). These core parameters must be monitored during at least three independent sampling events to determine whether a specific designated use assigned to the surface water is "attaining."

Core parameters were selected based on EPA guidance in the draft CALM document (EPA, 2001). This guidance places emphasis on narrative standards, suggesting that core indicators would include: bioassessments, habitat assessments, ambient toxicity testing, contaminated sediment, health of individual organisms, nuisance plant growth, algae, sediments, and odor and taste. Arizona's choice of core indicators may change in future assessments as standards change and other assessment tools and criteria are developed.

Table 5. Core Parametric Coverage

Required to Assess a Designated Use as "Attaining" Uses	
Aquatic and Wildlife:	~~Dissolved oxygen~~, flow (if a stream) and depth (if a lake), ~~pH~~, turbidity, ~~total nitrogen~~[1], ~~dissolved metals~~[2] (specifically copper, cadmium, chromium, and zinc) and ~~hardness~~.
Fish Consumption:	Metals[2] (specifically ~~total mercury~~)
Full Body or Partial Body Contact:	~~*Escherichia coli*~~ (if FBC), ~~fecal coliform~~ (if PBC), pH, metals[2] (specifically arsenic, beryllium, manganese).
Domestic Water Source:	~~Nitrate/nitrite or nitrate~~, pH, ~~fluorine~~ (fluoride) and metals[2] (specifically arsenic and barium).
Agriculture Irrigation:	Boron, pH, and metals[2] (specifically manganese).
Agriculture Livestock Watering:	Metals[2] (specifically copper and lead) and pH.

1. Nitrogen is required only in surface waters with nutrient standards.
2. Metals are required only at sites with current or historic mining activities in the drainage area.

Exempted Exceedance of Standards – Surface waters are not assessed as "impaired" if the exceedance is specifically exempted in Arizona's surface water standards or Impaired Waters Identification rules **(Appendix B and C)**. If an exceedance occurred, but was related to the following conditions or situations, they would be noted in the monitoring tables, but not used as evidence of impairment:

- Naturally-occurring conditions (A.A.C. R18-11-119). For this assessment, the naturally-occurring conditions exempted included:
  - Low dissolved oxygen occurring due to documented ground water upwelling;
  - Areas minimally impacted by human activity, where springs are the source of a pollutant due to natural deposits; or
  - Minimally impacted drainage areas, such as a small drainage in the Grand Canyon National Park, where excess turbidity is due to natural erosion of sandstone geological formations.
- Operation and maintenance of a canal, drain, or municipal park lake (e.g., dewatering, dredging, and weed control) (A.A.C. R18-11-117);
- Routine physical or mechanical maintenance of dams and flood control structures may cause increases in turbidity (A.A.C. R18-11-118); and
- Discharge of lubricating oil associated with start-up of well pumps which discharge to canals (A.A.C. R18-11-117).

Note that some bodies of water are not defined as a "surface water" in Arizona's surface water quality rules (e.g., wastewater treatment systems, lagoons, or impoundments). Surface water quality standards would not apply to these waters.

How much of a lake or stream is assessed?

Numerous hydrologic, geologic, and land use factors must be considered when determining the amount of a lake or stream that can be assessed based on each monitoring site. By default, Arizona assesses an entire surface water "reach" or lake based on one or more monitoring sites **(Figure 14 and text box)**.
As more monitoring data become available, differences in water quality in portions of a reach or a lake may become apparent, and the reach or lake is segmented. This has frequently occurred during TMDL investigations, as the extent of contamination becomes more defined.

New National Hydrography Dataset – Recently, a new National Hydrography Dataset (NHD) was developed by EPA and USGS that is replacing EPA's old reach file system. In Arizona, the NHD uses approximately the same digitized hydrography as the latest reach file system. The current assessment will be converted into the NHD by EPA using Arizona's revised GIS coverages, linking assessment data to the waterbody identification number. To complete this conversion, EPA will need to add a significant number of relatively small tributary streams and urban lakes to the NHD that are named in Arizona's surface water standards or have been monitored as part of special studies.

Reach Definition and Delineation

The US Geological Survey (USGS) has divided streams across the United States into drainage areas or Hydrologic Unit Code areas (HUCs). The Environmental Protection Agency then divided the streams into reaches based on hydrological features such as tributaries and dams, and provided a unique number for each stream reach. These numbers eliminate the ambiguity caused by many streams in Arizona having the same common name (e.g., Sycamore Creek). These reaches have been further divided by ADEQ due to changes in designated uses, hydrology, and documented changes in water quality. In **Figure 14**, 15060202 is the HUC and 028 is the reach.

Figure 14. Reach Delineation

How do lake and stream assessments differ?

The depth of a lake adds an additional level of complexity to an assessment. Samples are frequently collected at multiple levels in a lake because lower levels of a lake may have naturally higher chemical concentrations, especially when the lake is "stratified." Stratification is a natural process in which several horizontal water layers of different density may form in a lake. During stratification, the bottom layer (hypolimnion) is cool, high in nutrients, low in light, low in productivity, and low in dissolved oxygen. The top layer (epilimnion) is warm, higher in dissolved oxygen, light, and production, but normally lower in nutrients. The sharp boundary between the two layers is called a thermocline (metalimnion). Lake stratification is caused by temperature-created differences in water density.

Some measurements are more commonly taken in lakes or are used in a different way in lakes than in streams. For example, Chorophyll-*a,* Secchi depths, and volatile suspended solids results are compared to total suspended solids and turbidity values to determine whether excessive turbidity is actually related to a planktonic algal bloom and potential excessive nutrients or is related to suspended sediments and potential excessive lake sedimentation.

Trophic Status -- In addition to comparing water quality monitoring results with standards, ADEQ classifies lakes according to trophic status. Lakes are classified in a continuum of lake stages from low productivity to high productivity as nutrients accumulate or are depleted in the system.

Oligotrophic - Low algal or plant productivity
Mesotrophic - Medium algal or plant productivity
Eutrophic - High algal or plant productivity, and
Hypereutrophic - Very high algal or plant productivity and light-limited
(Algae shades available light, inhibiting further growth)

A trophic classification is included in the assessment tables in Chapter V. The "Trophic Status Index" used in this assessment integrates phosphorus, nitrogen, Secchi depth, and Chlorphyll_*a* data, as indicated in **Table 6.** This trophic classification is based on: Brezonik, Patrick L. 1986. "Trophic State Indices: Rationale for Multivariate Approaches", *Lake and Reservoir Management,* USEPA, Office of Water. 440/5/84-001, pages 441-445. The lakes program plans to refine this trophic analysis in the future by accounting for macrophytes, algal diversity, and biovolume.

Given sufficient time, lakes go through a natural trophic progression accumulating nutrients and biomass. However, activities within the watershed may unduly speed up this process. It is important to note that most lakes in Arizona are constructed and their hydrologic design (e.g., shallow, with little water flow through) may create management challenges such as high productivity and sedimentation.

Table 6. Trophic Classification Thresholds

	TROPHIC STATUS			
	Oligotrophic	Mesotrophic	Eutrophic	Hypereutrophic
Trophic Status Index	<30	30-45	45-65	>65
Chlorophyll-a (µg/L)	<5	5-12	12-20	>20
Secchi Depth (meters)	>3	1.2-3	0.6-1.2	<0.6
Total Phosphorus (mg/L)				
Phosphorus-limited	<10	10-20	20-35	>35
Nitrogen & Phosphorus-limited	<13	13-35	35-65	>65
Total Nitrogen (mg/L)				
Nitrogen-limited	<0.25	0.25-0.65	0.65-1.1	>1.1
Nitrogen & Phosphorus-limited	<0.28	0.28-0.75	0.75-1.2	>1.2

Nitrogen- limited = nitrogen : phosphorus ratio is <10.
Phosphorus-limited = nitrogen : phosphorus ratio is > 30.
Nitrogen and phosphorus-limited (colimited) = nitrogen : phosphorus ratio is 10-30

Public availability of monitoring data

ADEQ continues to look for ways to share the data used in this assessment report with the public. Monitoring data are summarized in the watershed monitoring tables in Volume II. These data tables indicate which agency and program collected the data, the amount and type of data, and dates collected, frequency of exceedances, and more. Ambient surface water quality data collected by ADEQ staff can be obtained through EPA's STORET database on the internet at http://www.epa.gov/STORET.

IV. How Clean Is Surface Water in Arizona?

A statewide overview of assessments is provided in this chapter. A map illustrating surface waters assessed **(Figure 17)** indicates that surface water in Arizona is generally attaining its designated uses. Assessment information about individual surface waters is provided in Volume II. The discussion and graphics in this section relate only to the assessed surface waters located on nontribal lands in Arizona.

Water quality in rivers, canals, and washes.

For this assessment, 2547 miles of streams, canals, and washes were assessed **(Figure 15 and Table 7.)**. Although this is less than 3% of the 90,375 miles of Arizona's streams, it includes 57% of the state's perennial stream and canal miles (1998 miles of the estimated 3530 perennial miles). Monitoring and assessing surface waters that lack flowing water present a set of challenges, so Arizona's goal is to assess all of its perennially flowing streams and the majority of the streams with extended intermittent flow.

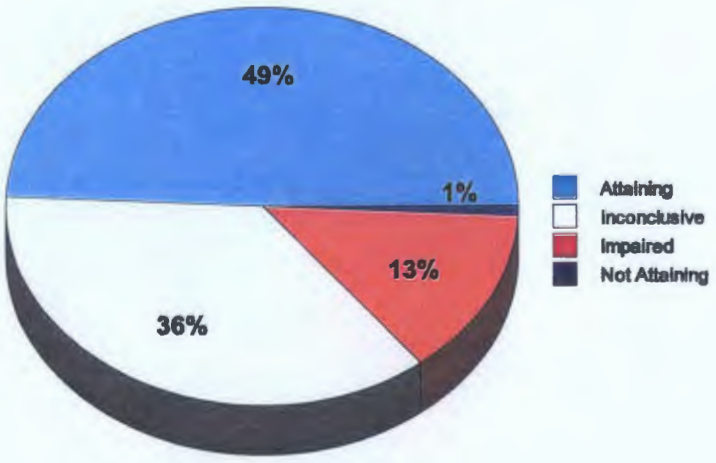


Figure 15. Use Support Assessments – Streams

As illustrated in **Figure 16**, the relative number of stream miles attaining a given designated use is approximately consistent across all designated uses, with 30-50% attaining the use, 30-50% inconclusive and needing more monitoring, and only 0-15% impaired or not attaining the use. (In **Figure 16 & 19**, "Body Contact" combines Full Body Contact and Partial Body Contact designated uses.)

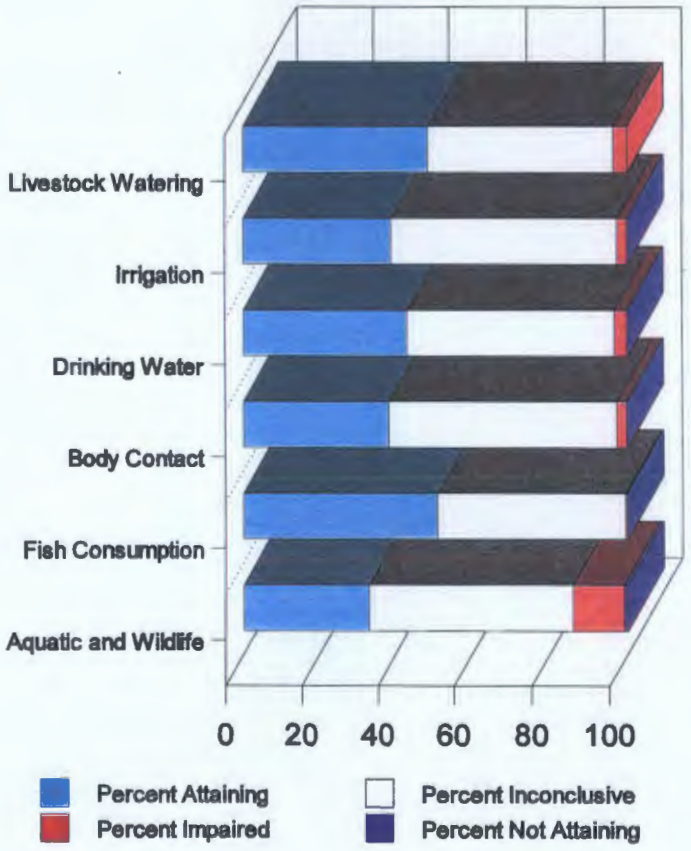


Figure 16. Designated Use Support by Category – Streams

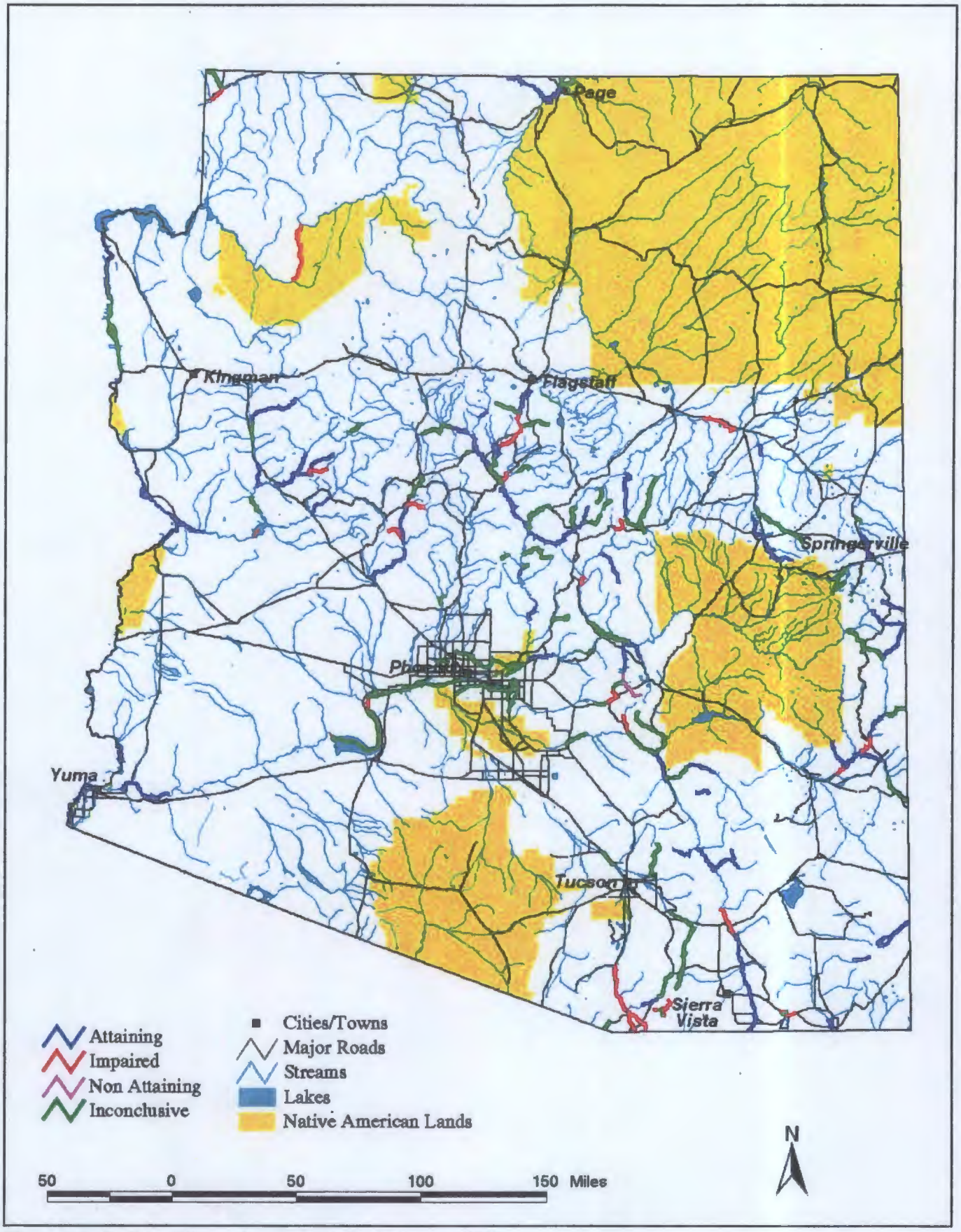


Figure 17. Surface Water Assessments in Arizona – 2002

Table 7. Use Support Summary – Streams Assessed in 2002

Designated Uses	Attaining (miles)	Inconclusive (miles)	Impaired (miles)	Not Attaining (miles)	Total Assessed (miles)
Overall Use Support	**1253.7**	**929.2**	**342.1**	**22**	**2547**
Aquatic and Wildlife (combined)	**775.1**	**1255.8**	**308.3**	**21**	**2360.3**
Coldwater Aquatic Community	374.2	564	90.4	0	1028.6
Warmwater Aquatic Community	395.6	633.3	185.1	20	1234
Ephemeral	0	16.4	10.9	1	28.4
Effluent Dependent Water	5.3	42.1	21.8	0	69.2
Recreation (combined)	**1204.4**	**1097.5**	**105.2**	**1**	**2408.1**
Fish Consumption	1190.8	1130.7	10	0	2331.5
Full Body Contact	839.4	1301.3	58.3	1	2200
Partial Body Contact	5.3	101.7	36.9	0	143.9
Domestic Water Source	**220.8**	**274.8**	**17**	**0**	**512.6**
Agriculture (combined)	**1171.2**	**1114.6**	**87.8**	**0**	**2373.6**
Agricultural Irrigation	632.8	953.6	42.2	0	1628.6
Agricultural Livestock Watering	1149.4	1126.5	82.5	0	2358.4

Water quality in lakes and reservoirs.

Of approximately 168,600 acres of perennial lakes or reservoirs in Arizona (not on Indian lands), 84,643 acres (50%) were assessed. There are approximately 564 impoundments in Arizona, many of which have not yet been characterized. ADEQ's goal is to assess all perennial, publicly-owned lakes over the next two watershed cycles.

Of the lake acres assessed, 23% were attaining and less than 15% were impaired or not attaining **(Figure 18 and Table 8)**. Lakes vary greatly in size: urban city park lakes may be smaller than an acre, while the big reservoirs are larger than 10,000 acres. So, although these graphics depict the surface area of water impaired, they do not represent the number of lakes.

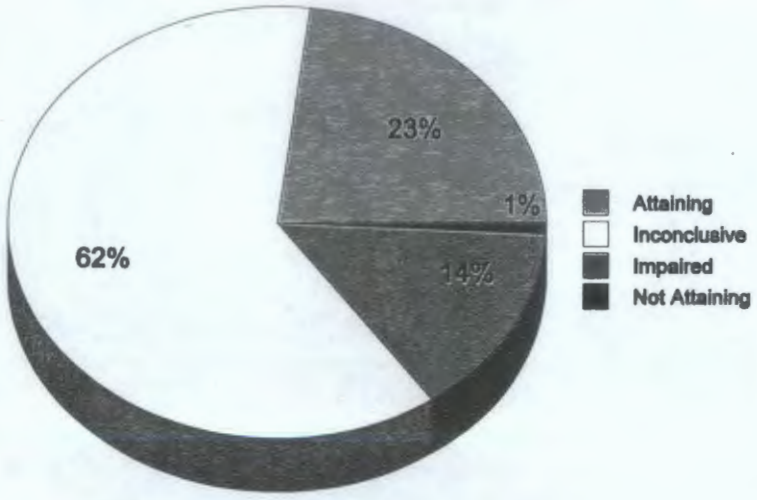


Figure 18. Use Support Assessments – Lakes

As illustrated in **Figure 19**, the percent of lakes attaining a given designated use is also consistent among all designated uses, with 20-30% attaining the use, 60-70% inconclusive and needing more monitoring, and only 0-20% impaired or not attaining the use.

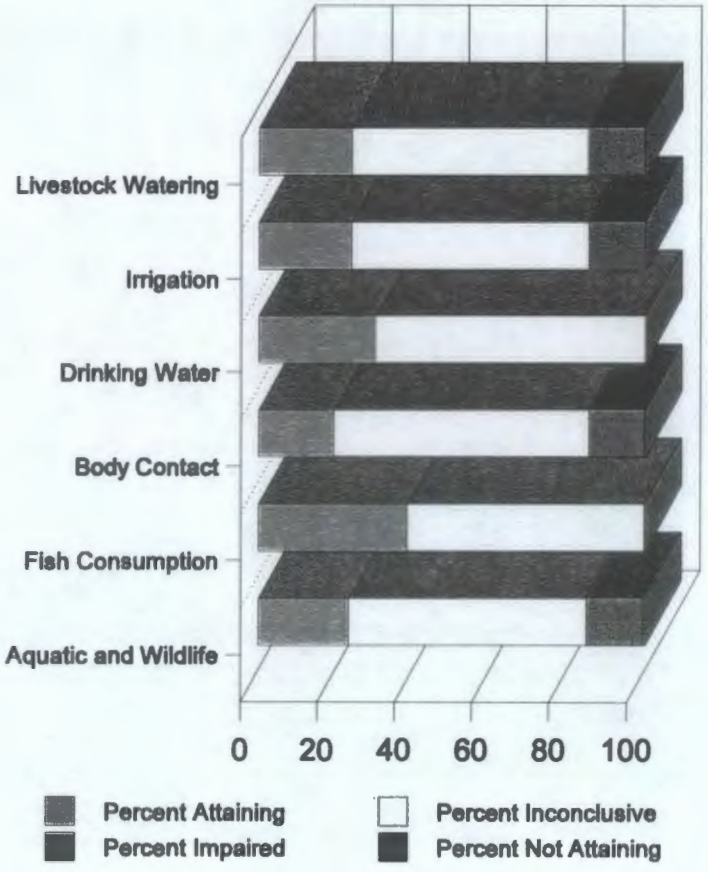


Figure 19. Designated Use Support by Category – Lakes

Table 8. Use Support Summary – Lakes Assessed in 2002

Designated Uses	Attaining (acres)	Inconclusive (acres)	Impaired (acres)	Not Attaining (acres)	Total Assessed (acres)
Overall Use Support	**20275**	**51392**	**12136**	**840**	**84643**
Aquatic and Wildlife (combined)	**19697**	**52040**	**12247**	**560**	**84544**
Coldwater Aquatic Community	1158	29295	125	231	30809
Warmwater Aquatic Community	18539	22930	11950	95	53514
Ephemeral	0	0	0	220*	220*
Effluent Dependent Water	0	0	0	0	0
Recreation (combined)	**20291**	**51472**	**12136**	**634**	**84533**
Fish Consumption	32486	51658	0	169	84313
Full Body Contact	16341	55605	11950	245	84141
Partial Body Contact	0	72	0	220*	292
Domestic Water Source	**19561**	**45372**	**0**	**0**	**64933**
Agriculture (combined)	**20308**	**51411**	**12136**	**245**	**84100**
Agricultural Irrigation	20080	51480	12136	125	83821
Agricultural Livestock Watering	20216	51479	12136	245	84076

* Note that Tempe Town Lake was assessed using Salt River designated uses according to the Tributary Rule (R18-11-105); therefore, the lake was assessed as Aquatic and Wildlife ephemeral with Partial Body Contact. Specific designated uses for this surface water have been developed, but need to be approved by EPA through the Triennial Review Process before they can be applied. If already adopted, the overall assessment would remain the same ("not attaining," but new lake management program is being implemented to control algal growth and pH); however, the specific designated uses would be changed.

What pollutants impair Arizona's lakes and streams?

The pollutant is a substance causing a designated use to be assessed as "impaired" or "not attaining" when the amount exceeds an established water quality standard. Pollutants identified in this assessment are summarized in **Table 9 and 10** and compared in **Figures 20 and 21.** More than one pollutant may be simultaneously impacting a stream reach or lake.

Table 9. Pollutants Impairing Arizona's Streams – 2002

	Impaired or Not Attaining (miles)
Metals/Metalloids	
arsenic	3
beryllium	10
boron	5.3
cadmium	36.7
copper	122.8
manganese	9.8
silver	17.4
zinc	96
any metal*	**149.4**
Turbidity	125.4
Pathogens	60.6
Other Chemicals	
Fluoride	28.5
pH	
low pH	18.3
high pH	0
Nutrients	
Nitrate	15.5
Chlorine	7.2

*Note that multiple pollutants may be impairing a stream segment.

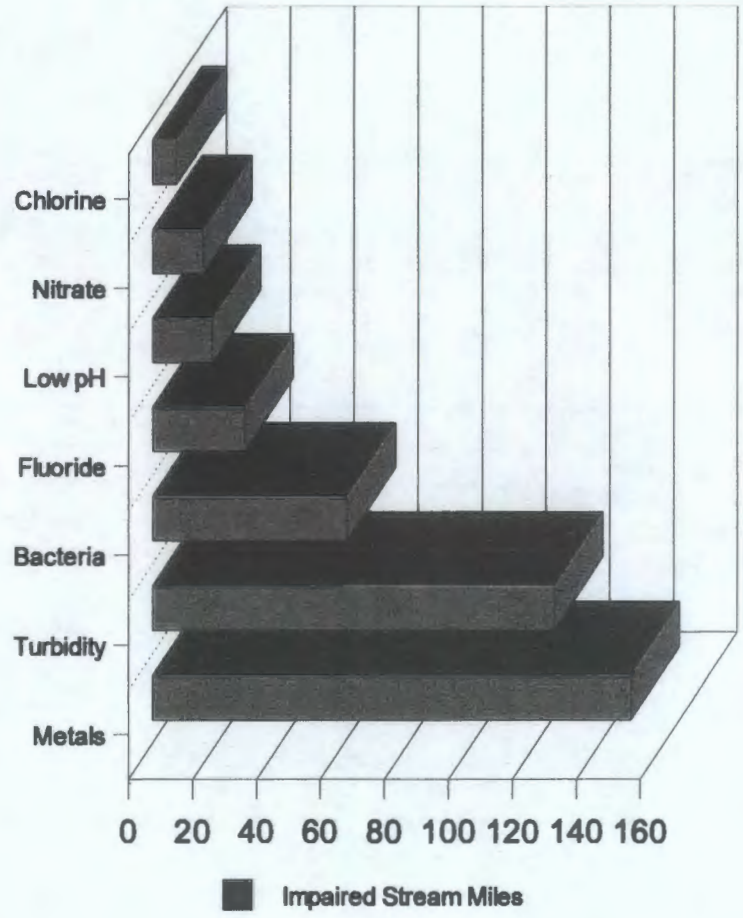


Figure 20. Pollutants impairing streams – 2002 Assessment

Table 10. Pollutants Impairing Arizona's Lakes – 2002

	Impaired or Not Attaining (acres)
pH	
Low pH	0
High pH	1974
Low Dissolved Oxygen	1820
Other Chemicals	
Sulfide	1414
Nutrients	231
Pathogens	186
Metals	
Mercury	169

Information about the pollutants impairing a specific lake or stream is provided in Volume II. However, some general information about these pollutants and their sources follows.

Metals – Metals can leach more readily from soil or mineralized rock where exposed by mining, road building or land development activities. Ore bodies can also naturally contribute metals to streams and ground water springs recharging streams. Arizona has extensive areas of mineralized rock, and therefore, a high potential for metals pollution.

To date, mercury has only been found to be a problem in Arizona's lakes, while the other metals are generally exceeding standards in streams. This is due to the characteristics of these metals. Generally metals (e.g., beryllium, cadmium, copper, manganese, mercury, silver, and zinc) rapidly adhere to sediment, with the more toxic dissolved metals being present in surface water only for relatively short distances near mining sites or other potential sources. These discharges are located near streams in Arizona, and therefore, effect stream water quality. When metal-contaminated sediment is transported downstream to a lake, the water slows and the sediments drop to the bottom of the lake. Metals do not readily go back into a dissolved state in these relatively alkaline lakes, and the contamination is buried under layers of sedimentation.

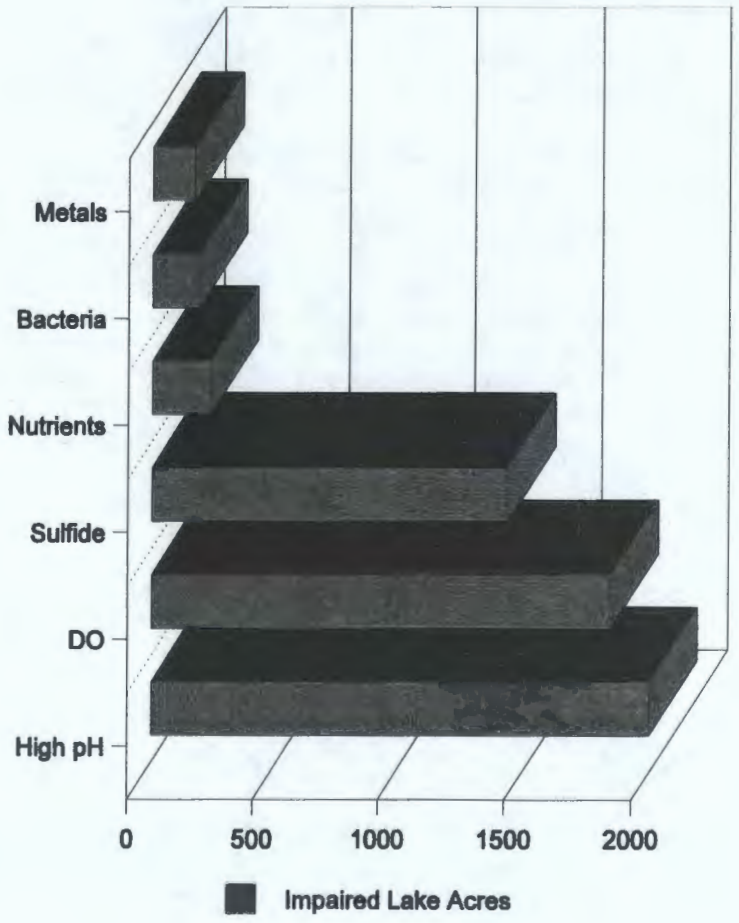


Figure 21. Pollutants Impairing Lakes – 2002 Assessment

Mercury is an exception. Once elemental mercury is methylated by microbes in the bottom of the lake, methylmercury can then bioaccumulate in aquatic life. The concentration of mercury then biomagnifies (compounds) as contaminated tissue is consumed in the food chain. This also means that mercury can occur well below the detection limit in surface water samples and even in the sediment, while fish tissue can be contaminated through bioaccumulation to a level that is

sediment, while fish tissue can be contaminated through bioaccumulation to a level that is hazardous for human consumption or for wildlife that prey on these fish.

Turbidity – Turbidity is actually a measurement of the clarity of water. Turbidity standards were developed to protect Aquatic and Wildlife designated uses because high turbidity may be associated with aquatic habitat degradation such as excessive bottom deposits or algal blooms. Arizona's turbidity standard was derived from criteria established in more humid states that do not share its unique arid conditions and resulting relatively low plant coverage and erodible soils. A revision to the surface water standards has been submitted to EPA for approval as part of the recently completed 2002 Triennial Review. If approved by EPA, the turbidity standard would be replaced with a "suspended sediment concentration" standard that is applied only at base flow. For more information concerning this standard, contact the Surface Water Standards Program -- Steve Pawlowski at (602) 771-4219. For this assessment, water quality samples were evaluated based on the existing turbidity standard. If sufficient exceedances exist, waters were listed as impaired due to turbidity.

Low Dissolved Oxygen, High pH and Nutrients – Varying combinations of these factors occur in many of Arizona's shallow, constructed lakes. Low dissolved oxygen and high pH stress aquatic organisms and can contribute to fish kills. A high density of submerged and emergent aquatic vegetation can restrict recreational activities. In addition, algal blooms which can result from increased nutrients use a substantial amount of oxygen in the water at night when photosynthesis cannot take place. Significant decreases of dissolved oxygen can result in fish kills.

What are the major sources of these pollutants?

The probable sources of pollutants impairing water quality in Arizona are reported in **Tables 11 and 12** and compared in **Figures 22 and 23.** More than one source may be impacting a given stream reach or lake. Documented source identification has been limited to data collected for special investigations or for the development of Total Maximum Daily Load analysis. For many assessments, only potential sources are indicated based on best available information, knowledge of land uses and activities, and geology of the watershed.

Natural Contributions -- While pollution is defined in the Clean Water Act section 502 as a manmade or human-induced alteration of the chemical, physical, biological, and radiological integrity of water, high levels of a pollutant which occur solely due to natural conditions are not a violation of Arizona's surface water quality standards because of a "natural background" exemption in the standards. However, determining the relative contribution of natural sources among other potential sources may require sophisticated analysis requiring large amounts of data. This level of detailed analysis is conducted for a TMDL, use attainability analysis, or to develop a site-specific standard.

For most assessments, natural conditions are assumed to contribute some pollutants. In many areas, Arizona's soils are highly erodible, and therefore have potential to contribute suspended sediment easily. Soils also have naturally elevated levels of metals. Sunny and arid conditions can lead to excessive algal productivity and eutrophic lake conditions such as low dissolved oxygen and high pH.

Resource Extraction – Resource extraction activities and the natural occurrence of ores are frequently the source of metals and low pH in Arizona's streams. Mining occurs in Arizona because metal ores are present.

Nutrient Cycling – Although normal for a lake system, nutrient cycling may also be a contributing source of nutrient over-enrichment and hypereutrophic conditions.

Shallow Lake Design and Maintenance – The construction and maintenance of a relatively shallow lake can result in negative impacts to the water chemistry or biological community. The physical characteristics of the lake (depth, volume, flushing rate) need to be in balance with natural rates of sediment transport and trophic conditions. When a lake or reservoir routinely exceeds narrative or numeric standards, viable options to redesign or change maintenance procedures of the surface water may be necessary to alleviate the water quality problems.

Agriculture -- Agricultural concerns can be broadly grouped into three areas of concern: crop production, agriculture, and grazing.

- Irrigated crop production is a probable source of pollutants such as turbidity, boron, selenium, nutrients, and pesticides. Crop production is concentrated around areas with adequate surface or ground water in

Arizona, such as along the Colorado River, the Salt River, the Gila River, and the Verde River.

- Livestock and wildlife grazing is ever present, occurring on lands owned or managed by federal agencies, Arizona State Land Department, privately owned lands and Indian reservations. Grazing activities may contribute pollutants such as bacteria, nutrients, and suspended sediments (measured as turbidity).
- Concentrated animal feeding operations (CAFOs) are scattered across the state. These livestock holding areas are a concern due to potential discharges of nutrients, bacteria, and turbidity to surface and ground waters.

Table 11. Probable Sources of Streams Pollutants – 2002

	Impaired or Not Attaining (miles)
Natural Sources	290.1
Resource Extraction (including abandoned mines)	155.7
Unknown Source	146.3
Source Outside Arizona Jurisdiction (Mexico, Indian lands, or other state)	71.7
Agriculture	**56.7**
Crop Production	5.3
Grazing Practices	51.4
Recreation (non-boating)	54.5
Municipal Point Sources	27.7
Ground Water Loadings	15.5
Waste Disposal	15.5

Multiple sources may be impacting a stream reach.

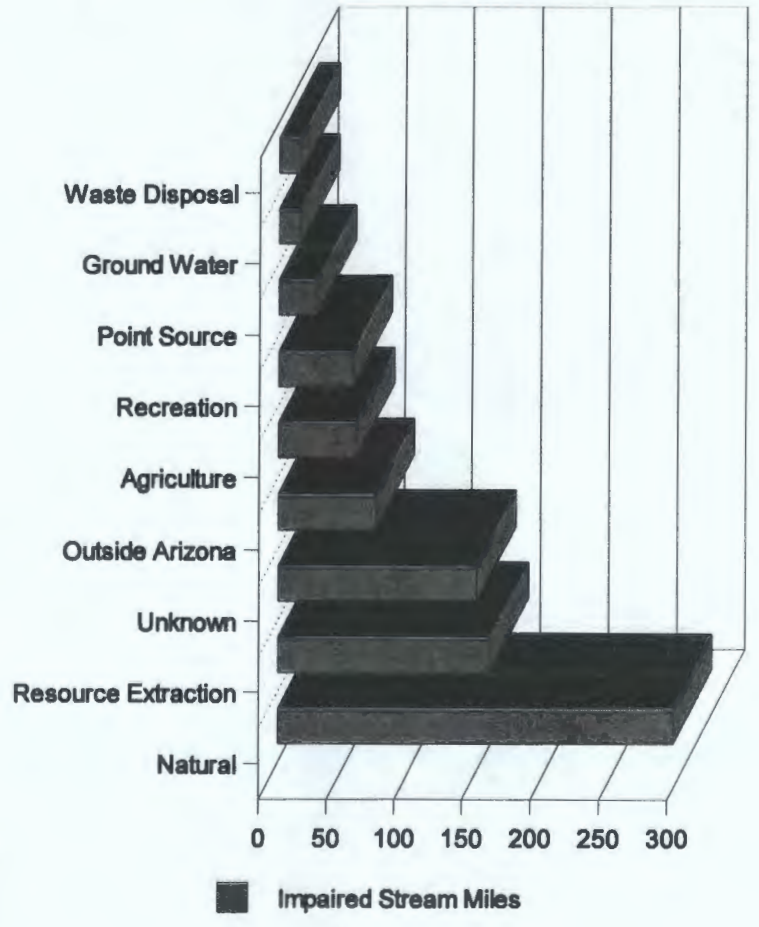


Figure 22. Probable Sources of Pollutants in Streams – 2002

Table 12. Probable Sources of Lake Pollutants – 2002

	Impaired or Not Attaining (acres)
Natural Sources	2278
Unknown Source	1863
Internal Nutrient Cycling	671
Design and Maintenance	621
Agriculture Crop production Grazing practices	**316** 186 130
Stormwater Runoff	186
Atmospheric Deposition	169
Septic systems	125
Silviculture (forestry practices/forest roads)	120
Resource Extraction (including abandoned mines)	51

Multiple sources may be impacting a lake acre.

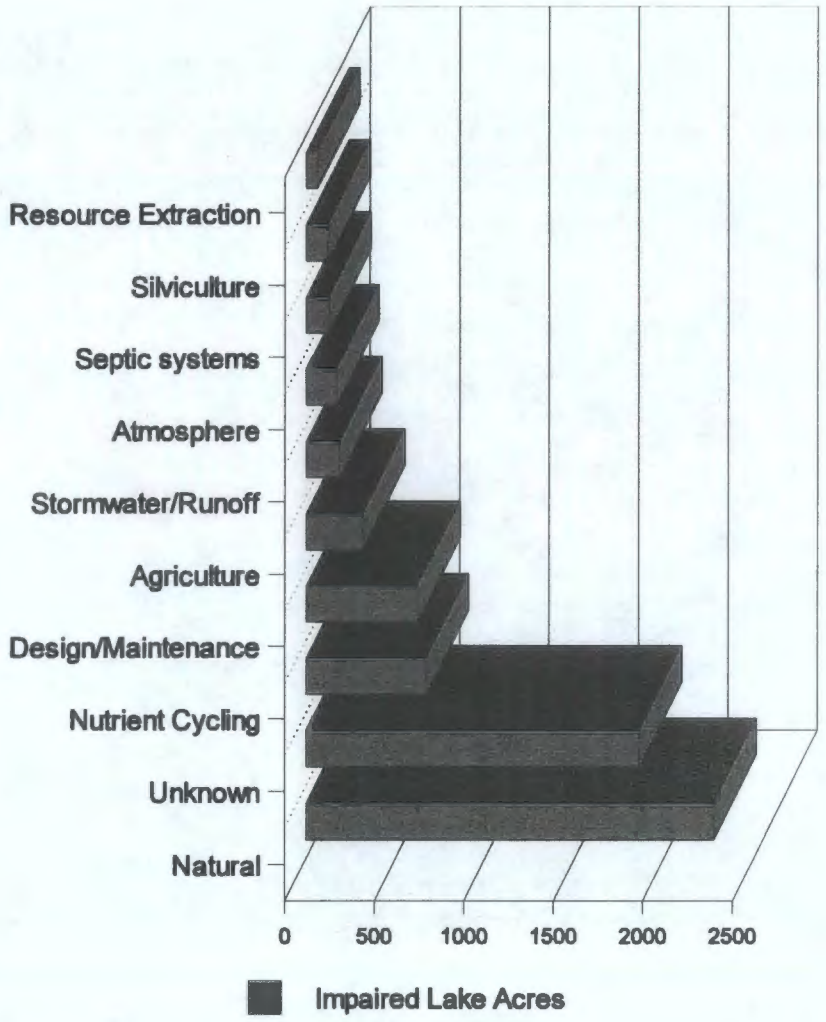


Figure 23. Probable Sources of Pollutants in Lakes – 2002

A few words about point and nonpoint sources.

Water pollution is often discussed in terms of "point" and "nonpoint" sources. Thirty years ago, federal and state regulations primarily governed point source discharges through NPDES permit requirements. Point sources come from a discrete discharge point or discharge pipe (e.g., wastewater treatment plant discharge). However, water pollution also comes from more diffuse sources that are referred to as nonpoint sources, such as runoff from fields, urban areas, or mining operations.

As indicated in **Table 13,** most pollution in Arizona's surface waters is contributed by nonpoint or diffuse sources of pollution. This may indicate the effectiveness of the state and federal regulatory programs working with point source discharges and that control of nonpoint source contributions largely remains non-regulatory, based on education and funding mitigation projects.

Table 13. Point and Nonpoint Source Contribution to Impairment

	Streams, Canals, Washes	Lakes and Reservoirs
Point Sources	27.7 miles	0 acres
Nonpoint Sources	358.8 miles	620 acres

*Note that the stream miles impaired by point sources are also impaired by nonpoint sources.

For example, in addressing nonpoint source contributions to an impaired surface water, the TMDL Program works with all interested parties to identify credible implementation strategies to mitigate the problem. Then ADEQ's Nonpoint Source and Watershed Management Programs work with the local watershed work groups and federal agencies to identify funding sources to implement control strategies. Federal agencies such as the Forest Service and Bureau of Land Management, address nonpoint source pollution in their management strategies by requiring the implementation of Best Management Practices.

Current nonpoint source projects are described in Volume II, within the watershed reports.

Is the water safe to drink, swim in, and fish from?

Can We Drink the Water? – The quality of water delivered by public water systems is strictly regulated and monitored to ensure that federal and state standards established to protect public health are met. Drinking water advisories are issued by the supplier when monitoring confirms that a drinking water standard has been exceeded. If water is supplied by a public water system, information about the quality can be obtained by contacting the supplier and requesting a consumer confidence report, or by contacting ADEQ's Drinking Water Program at 1-800-771-5677 extension 4624.

When water is supplied by a private water system (i.e., a system serving less than 15 connections and 25 people), it is the user's responsibility to test and protect the quality of their drinking water. General water quality information and ways to protect drinking water sources can be obtained by contacting a county health department. Ground water quality information about wells monitored in an area can also be obtained from EPA's STORET database through the internet at: http://www.epa.gov/STORET

Is It Safe to Swim in the Water? – During the swimming season in 1999 through 2001, frequently visited swimming areas were monitored at Slide Rock, Lake Havasu, Lake Powell, and the Salt River Recreation Area. Beaches have been closed when sample results exceed water quality standards and remain closed until standards are met. Investigations of potential sources have been completed in these swimming areas, and have resulted in actions to control contamination and risk to public health (see studies and mitigation projects in Volume II). Monitoring at each of these popular swimming areas is summarized in the following discussion.

- Slide Rock State Park monitors water quality daily during the summer at Slide Rock in Oak Creek. A bacteria Total Maximum Daily Load (TMDL) analysis has been completed on Oak Creek at Slide Rock State Park to estimate contributing loads from sources within this sub-watershed and to develop alternatives to mitigate these impacts to water quality. (See TMDL discussion in the Verde Watershed section of Volume II.)
- Mohave County monitors beaches twice a week in Lake Havasu during the summer. No beach closures occurred in 2000 or 2001 after extensive studies and mitigation actions in Thompson Bay in the 1990's.

- The Bureau of Reclamation monitors beaches once a week during the summer in Lake Powell. Lake Powell beach closures have occurred only in Utah.
- The US Forest Service monitors the Salt River Recreation Area under contract by ADEQ. Monitoring data show nominal bacterial levels, well below standards established for swimming or full body contact. ADEQ awarded a Water Quality Improvement Grant to conduct weekly monitoring and improve sanitary conditions in this heavily used recreation area.

Information about swimming area closures during the past two years is reported in **Table 14.** ADEQ is unaware of routine monitoring at other swimming and water-skiing areas. Past bacteria monitoring suggests swimming should be avoided in storm water runoff and if the water has become stagnant. Waters classified as "effluent dependent waters" and many urban lakes are also not designated for swimming or wading uses.

Table 14. Swimming Area Closures 1999-2001

Waterbody Name Size	Pollutant and Sources	Closure Dates
Beaches in Thompson Bay of Lake Havasu 150 acres	Bacteria in water and sediment in the past.	Sept. 1999
Slide Rock 1 mile segment of Oak Creek	Bacteria in water and sediment. High flows or large numbers of people stir up sediments, raising bacteria counts to levels that merit swimming area closures.	July 15, 1999 July 26, 1999 Aug 16, 1999

Should We Eat the Fish? – Some chemical pollutants concentrate in fish and shellfish by accumulating in fatty tissues or selectively binding to muscle tissue. Some of these pollutants cannot be detected in the water column nor in bottom sediments, but bioaccumulate in aquatic life. This bioaccumulation may pose a threat to human health if these organisms are eaten on a regular basis in excess of federal fish consumption advisory guidelines.

Fish consumption advisories are issued to inform the public about possible adverse health effects and contain recommendations for how many fish meals can safely be consumed. Advisories may be directed at a particular subset of the population because some people are at greater risk (e.g., sport or subsistence fishers, pregnant women and children) rather than a total ban.

In Arizona, fish consumption advisories are currently in effect at four sites **(Table 15)**. Additional information about fish tissue screening and fish advisories can be obtained by contacting ADEQ at (602) 771-4536 or Arizona Game and Fish Department at (602) 789-3260.

Table 15. Fish Consumption Advisories – 2002

Waterbody Name Size	Pollutant and Sources	Advisory and Date
Painted Rocks Reservoir, Painted Rock Borrow Pit Lake, and portions of the Gila, Salt, and Hassayampa rivers – 380 acres and 140 miles	DDT metabolites, toxaphene, dieldrin, and chlordane pesticide pollutants due to historic use of these banned pesticides.	Since 1991 – Do not consume fish and other aquatic organisms.
Dysart Drain (canal drains to Agua Fria River in the Phoenix metro area) – 3 miles	DDT metabolites contamination caused by historic use of this pesticide.	Since 1995 – Do not consume fish and other aquatic organisms.
Arivaca Lake – 120 acres	Mercury contamination. Potential sources include mine tailings, atmospheric deposition, and naturally mineralized soils.*	Since 1996 – Do not consume fish and other aquatic organisms.
Pena Blanca Lake – 50 acres	Mercury contamination caused by historic mining and natural conditions at the lake.*	Since 1995 – Do not consume fish and other aquatic organisms.
Upper and Lower Lake Mary – 1625 acres combined	Mercury contamination. Sources to be investigated.	Issued May 2002 – Do not consume walleye fish and limit consumption of other fish to one 8-ounce fillet per month.

* Source identification and remediation actions have been developed through the Total Maximum Daily Load (TMDL) analysis process (see Chapter VII).

ADEQ is investigating opportunities to combine resources from multiple programs to determine the source, transport, and fate of historically used pesticides along the Gila River and its tributaries between Phoenix and Painted Rocks Lake. This study could be used to update the health risk assessment issued in 1991 by the Arizona Department of Health Services and to complete a TMDL analysis for these pesticides. (See Middle Gila Watershed -- Volume II.)

recommending that these most vulnerable groups limit fish consumption to one meal per week. That would be six ounces of cooked fish (eight ounces of uncooked fish) for an adult, and two ounces of cooked fish (three ounces uncooked) for a young child. US Food and Drug Administration has a companion advisory concerning the hazard posed by some fish purchased commercially (http://www.cfsan.fda.gov).

Nationally, mercury is introduced into water at higher than natural background levels due to air deposition. However, the main sources of mercury in Arizona are natural deposits and anthropogenic use of mercury. When mercury enters the water, biological processes transform it into the highly toxic form of methylmercury. Methylmercury accumulates in fish, with larger predatory fish generally accumulating higher levels of methylmercury. Methylmercury is a potent toxin and babies of women who consume large amounts of fish when pregnant are at greater risk for changes in their nervous system that can affect their ability to learn.

Further Investigations – In cooperation with the Arizona Game and Fish Department, ADEQ is investigating human health risks associated with eating fish caught in Arizona's lakes. Fish tissue samples have been collected and analyzed for mercury from the following lakes which were chosen due to present or historic mining, the presence of predatory fish (e.g., largemouth bass, channel catfish, or northern pike), and recreational fishing activity:
Bill Williams Alamo Lake (Bill Williams Watershed); Dogtown Reservoir (Colorado-Grand Canyon Watershed); Ashurst Lake, Fool's Hollow Lake, Lake Mary, Lyman Lake, and Mormon Lake (Little Colorado-San Juan Watershed); Horsethief Basin Lake, Lynx Lake, and Picacho Reservoir (Middle Gila Watershed); Parker Canyon Lake (Santa Cruz-Rio Magdalena-Rio Sonoyta Watershed); Dankworth Ponds and Roper Lake (Upper Gila Watershed); and Goldwater Lake, Granite Basin Lake, Pecks Lake, Stoneman Lake, Watson Lake, and Willow Creek Reservoir (Verde Watershed). Results from this monitoring lead to a fish consumption advisory being issued in May 2002 for Upper Lake Mary and Lower Lake Mary due to the mercury contamination of fish tissue **(Table 15)**.

Why do Fish Kills or Abnormalities Occur? – Fish kills investigated by Arizona Game and Fish Department and found to be due to a water quality concern are reported in **Table 16**. Most of these fish kills were associated with highly productive (eutrophic or hypereutrophic) lakes. Although lake eutrophication is a natural process, it can be accelerated by human activities in the watershed or lake design. Fish kills caused by a reduction in water quantity (i.e., drought, dam releases) or because non-native game fish have been stocked in habitats that cannot support them, are not reported in **Table 16**.

Table 16. Reported Fish Kills and Abnormalities -- 1997-2000

Waterbody Name Watershed – Size	Pollutant and Sources	Dates
Arivaca Lake Santa Cruz-Rio Magdalena-Rio Sonoyta 120 acres	Algal bloom die off and resulting low dissolved oxygen killed 4000-5000 fish over a 4-day period.	June 1999
Cortez Park Lake Middle Gila Watershed 2 acres	Herbicide applications resulted in a massive die-off of aquatic vegetation. Associated low dissolved oxygen then killed approximately 2600 fish.	June 1999
Lake Pleasant Middle Gila Watershed 2,040 acres	Insufficient dissolved oxygen caused by resuspended organic sediments in flood waters.	August 1997
Lakeside Lake Santa Cruz-Rio Magdalena-Rio Sonoyta 14 acres	Insufficient dissolved oxygen caused by algal bloom, exacerbated by high nutrient levels in reclaimed wastewater discharged to the lake.	July 1997
Lake Sierra Blanca Salt Watershed 30 acres	Weed growth and subsequent high pH resulted in the death of approximately 100 rainbow trout.	June 1998
Luna Lake Upper Gila Watershed 120 acres	Algal bloom die-off, high pH, and low dissolved oxygen resulted in several hundred fish dying over a 16-day period.	July 1999
Rainbow Lake Little Colorado-San Juan Watershed 110 acres	Blue-green algal bloom die-off resulted in insufficient dissolved oxygen that killed trout and catfish	June 1997
Salt River, below 91st Ave. WWTP Middle Gila Watershed 5 miles	Inadequate treatment (aeration and denitrophication) due to a power outage, resulted in an extensive fish kill in the Gila River and part of Buckeye Canal.	October 2000
Santa Cruz River below the Nogales International WWTP Santa Cruz-Rio Magdalena-Rio Sonoyta	A high proportion of fish with skin and skeletal anomalies are documented by the US Fish and Wildlife Service in this reach.	Sampling in 1997
Whitehorse Lake Verde Watershed 40 acres	Low dissolved oxygen due to algal bloom die off, killed approximately 4000 fish. The majority of the dead fish were non-native black crappie young of the year.	July 1999

V. Surface Water Assessments, Impaired Waters 303(d) List Submission, and the Planning List

This chapter provides the final assessment of individual surface waters, including whether the surface water will be on the 303(d) List and the basis for listing or delisting decisions. A separate table provides priority ranking and a schedule for completing TMDLs for each surface water on the 303(d) List.

The five-part assessment list

As requested in EPA's *2002 Integrated Water Quality Monitoring and Assessment Report Guidance*, ADEQ is submitting an assessment list that categorizes assessed waters into five categories **(Appendix D)**. Each surface water assessed is placed on one of the following five lists:

Part 1. Surface waters assessed as "attaining all uses," where each designated use is assessed as "attaining."

Part 2 Surface waters assessed as "attaining some uses," where each designated use is assessed as either "attaining," "inconclusive," or "threatened."

Part 3 Surface waters assessed as "inconclusive" due to insufficient data to assess any designated use (e.g., insufficient samples, sampling events or core parameters), where all designated uses are assessed as "inconclusive." This part includes waters that were "not assessed" for similar reasons.

Part 4 Surface waters assessed as "not attaining" and a Total Maximum Daily Load (TMDL) analysis will not be required at this time for one of the following reasons:

- 4 A. A TMDL has already been completed and approved by EPA but the water quality standards are not yet attained;
- 4 B. Other pollution control requirements are reasonably expected to result in the attainment of water quality standards by the next regularly scheduled listing cycle; or
- 4 C. The impairment is <u>not</u> related to a "pollutant" loading but rather due to "pollution" (e.g., hydrologic modification).

Part 5 Surface waters assessed as impaired for one of more designated uses by a pollutant. These waters must be prioritized for TMDL development **(Table 27).**

These categories can assist the state in identifying monitoring needs. For example:

- Part 1 waters will be monitored as part of the rotating watershed cycle as resources allow;
- Part 2, 3, and 4 waters are placed on the Planning List and targeted for further monitoring over the next two watershed cycles;
- Part 5 waters are placed on the 303(d) List and scheduled for monitoring to support development of a TMDL.

As illustrated in **Figure 24**, surface waters can move from one part of the list to another. The objective is to eventually have all surface waters attaining uses. (See monitoring strategies and priorities discussed in Chapter VII.)

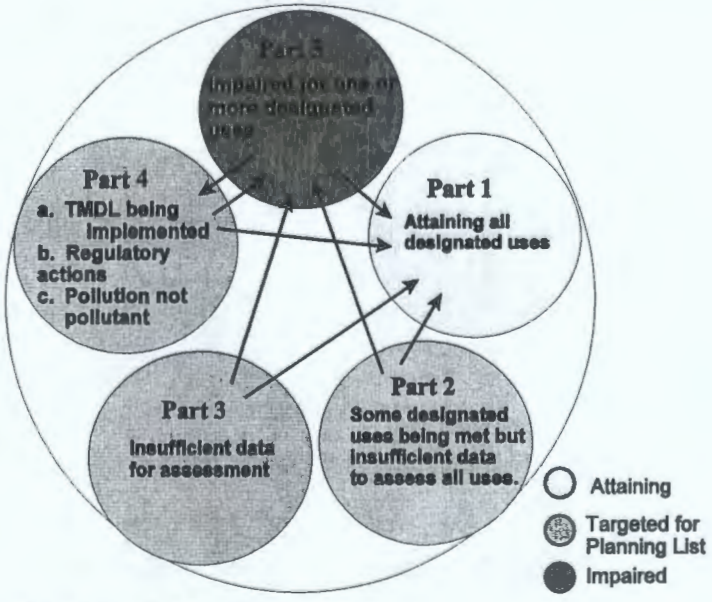


Figure 24. Five-Part Assessment List

Assessment tables, the planning list, and status of surface waters on the 1998 303(d) List

Surface water assessments are provided by watershed in **Tables 17-26**. From these tables the five-part 305(b) assessment list is prepared **(Appendix D)**. These are comprehensive tables, bridging current assessments with past assessments and impaired waters identification and they provide the following information:

- Assessments for each designated use: "attaining," "inconclusive," "not attaining," or "impaired" (see criteria in Chapter III);
- Which surface waters will be on the 2002 303(d) List submitted to EPA and the pollutants of concern;
- Which surface waters will be added to the Planning List and the pollutants of concern or reason for this action;
- Which pollutants and surface waters should be removed from the 1998 303(d) List and the reasons for this action; and
- Which TMDLs are ongoing or completed.

TMDL investigations have been initiated or completed on many of the surface waters on the 1998 303(d) List. The TMDL Program is highlighted in Chapter VII and completed TMDLs are summarized in the watershed portion of this report (Volume II).

303(d) List delisting criteria -- The criteria for listing or delisting a surface water are established in the Impaired Waters Identification rule **(Appendix B)**. In general, the same amount and type of data used to place a surface water on the 303(d) List is needed to remove it from the list. For example, if two bacterial exceedances in a 3-year period put it on the list, then no exceedances in a 3-year period could remove it from the list. However, the data must be collected during similar hydrologic or climatic conditions (i.e., critical conditions) that occurred when samples were taken that indicated impairment, if those conditions still exist. All data must meet the credible data requirements. The criteria for removing a surface water from the 303(d) List can be summarized as follows:

- There is sufficient credible data to determine that the surface water is assessed as "attaining" its designated uses based on numeric and/or narrative criteria for the pollutant of concern (see criteria in Chapter III);
- A TMDL has been completed;
- An EPA approved change in the applicable surface water quality standard or designated use results in the surface water meeting standards;
- Neither the older data nor the current data is sufficient to meet the new impaired waters identification criteria. For example, there are insufficient samples collected, sampling events, or exceedances.
- Investigations reveal that impairment is not due to a pollutant or surface water quality characteristic but rather due to "pollution" or other situation that cannot be readily addressed through a TMDL (e.g., hydrologic modifications).
- Pollutant loadings from naturally occurring conditions alone are sufficient to cause a violation of applicable water quality standards.

When removed from the 303(d) List, a surface water is added to the Planning List for further monitoring or other action unless all designated uses are assessed as "attaining."

Planning List delisting criteria -- Criteria for removing a surface water or pollutant from the Planning List is also established in the Impaired Waters Identification Rule (R18-11-605.E). A surface water is removed from the Planning List based on the following criteria:

- The surface water is assessed as impaired and added to the 303(d) List; or
- There is sufficient data to determine that the surface water is "attaining" all of its designated uses.

Relating the Planning List and 303(d) List -- A surface water may be on both the Planning and 303(d) Lists due to different parameters of concern. As stated above, when a surface water is removed from the 303(d) List, it is either added to the Planning List or all designated uses are assessed as "attaining." A surface water is removed from the Planning List when all designated uses are assessed as either "attaining" or "impaired." The only way to be removed from both lists is to be assessed as "attaining" all designated uses.

Assessment terms and criteria – Criteria for assessing designated uses and surface waters are provided in **Chapter III**, along with definitions for designated uses and the "core parametric coverage." These definitions and criteria are complex, so information in Chapter III should be reviewed before looking at tables in this chapter. However, to facilitate review of the assessment tables, summary definitions of some assessment terms are provided here. Monitoring tables in **Volume II** should also be referenced when reviewing the assessments in this chapter. These monitoring tables summarize the water quality data used. Volume II also describes water quality activities in the watershed that further support these assessments.

Assessing Designated Uses

Each designated use is assessed as follows:

Attaining – All surface water quality standards are being met based on a minimum of 3 monitoring events that provide seasonal representation and core parametric coverage.

Threatened – A surface water quality standard is currently being met, but a trend analysis indicates that the surface water is likely to be impaired before the next assessment.

Impaired – A surface water quality standard is not being met based on sufficient number of samples to meet the test of impairment identified in the Impaired Waters Identification Rule (Appendix B).

Not Attaining – A designated use would be assessed as "impaired" except that a TMDL does not need to be completed for one of the following 3 reasons:
A. A TMDL has already been completed and approved by EPA
B. Other pollution control requirements are reasonably expected to result in the attainment of water quality standards by the next regularly scheduled listing cycle.
C. The impairment is not related to a "pollutant" loading, but is caused by "pollution" (e.g. hydrologic modification).

Inconclusive – Monitoring or other assessment information available is insufficient to assess the surface water as "attaining," "threatened," "impaired," or "not attaining."

Designated Uses

Designated uses are specified for stream segments and lakes in the surface water rules (A.A.C. R18-11-104 and 105). Arizona's surface water designated uses include:

Aquatic and Wildlife
- **Coldwater Fishery** (A&Wc)
- **Warmwater Fishery** (A&Ww)
- **Ephemeral Stream** (A&We)
- **Effluent Dependent Water** (A&Wedw)

Full Body Contact (FBC) (i.e., swimming)
Partial Body Contact (PBC) (i.e., non-swimming recreation)

Fish Consumption (FC)

Domestic Water Source (DWS)

Agricultural Irrigation (AgI) and
Agricultural Livestock Watering (AgL)

Assessing the Surface Water

The individual designated use assessments are combined to provide an assessment of the surface water and each surface water is placed on one part of the 5-part assessment list as follows:

Attaining – A) All designated uses are assessed as "attaining" **(Part 1)**, or
B) At least one designated use is assessed as "attaining" and others are assessed as "inconclusive" or "threatened" **(Part 2)**.

Inconclusive – All designated uses are assessed as "inconclusive" **(Part 3)**.

Not Attaining – One or more designated use is assessed as "not attaining" and none are assessed as "impaired" **(Part 4)**.

Impaired – One or more designated is assessed as "impaired" **(Part 5)**.

Not Assessed – Existing data is limited to one sample or data did not meet credible data requirements established in the Impaired Waters Rule (e.g., lack of quality assurance plans or sampling analysis plans, failed to follow procedures in these plans, or procedures are inadequate). In these cases, the data is summarized in the monitoring tables (in Volume II), however, an assessment is not attempted and the surface water is added to the Planning List. If standards were exceeded, the surface water and the parameters of concern are shown on the assessment tables. **(Part 3)**

Core Parametric Coverage

The following parameters must have been monitored to assess a designed use as "attaining:"

Aquatic and Wildlife:	Dissolved oxygen, flow (if a stream) and depth (if a lake), pH, turbidity, total nitrogen[1], metals[2] (specifically dissolved copper, cadmium, chromium, and zinc) and hardness.
Fish Consumption:	Metals[2] (specifically total mercury)
Full/Partial Body Contact:	*Escherichia coli* (if FBC), fecal coliform (if PBC), pH, metals[2] (specifically total arsenic, beryllium, manganese).
Domestic Water Source:	Nitrate/nitrite or nitrate, pH, fluorine (fluoride) and metals[2] (specifically total arsenic and barium).
Agriculture Irrigation:	Boron, pH, and metals[2] (specifically total manganese).
Agriculture Livestock Watering:	Metals[2] (specifically total copper and lead) and pH.

1. Nitrogen is required only in surface waters with nutrient standards.
2. Metals are required only at sites with current or historic mining activities in the drainage area.

TABLE 17. ASSESSMENTS, PLANNING LIST, AND 303(d) STATUS TABLE – BILL WILLIAMS WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	Designated Use Assessments* 5-Part Listing Lake Trophic Status	Conclusions Pollutants of Concern	STATUS OF THE 1998 303(d) LIST	RECOMMENDATIONS FOR 2002 303(d) LIST
BILL WILLIAMS WATERSHED -- STREAM ASSESSMENTS				
Big Sandy River Deluge Wash-Tule Wash 8 miles AZ15030201-011	A&Ww Inconclusive FC Inconclusive FBC inconclusive AgL Inconclusive Part 3 — All Uses Inconclusive	Add to Planning List due to missing core parameters		
Big Sandy River Sycamore-Burro Creek 14 miles AZ15030201-004	A&Ww Attaining FC Attaining FBC Attaining AgL Attaining Part 1 — Attaining All Uses		Turbidity (A&Ww) — since 1992	Delist turbidity. No turbidity exceedances in 9 samples. Attaining all uses.
Big Sandy River Rupley Wash-Alamo Lake 10 miles AZ15030201-001	A&Ww Inconclusive FC Inconclusive FBC inconclusive AgL Inconclusive Part 3 — All Uses Inconclusive	Add to Planning List due to missing core parameters		
Bill Williams River Point B-Colorado River 15 miles AZ15030204-001	A&Ww Attaining FC Attaining FBC Inconclusive AgL Attaining Part 2 — Attaining Some Uses	Add to Planning List due to missing core parameters		
Boulder Creek headwaters - Wilder Creek 29 miles AZ15030202-006	A&Ww Inconclusive FBC Impaired FC Attaining AgI Inconclusive AgL Attaining Part 5 — Impaired	Impaired by fluoride (fluorine) Add to Planning List due to missing core parameters		Add fluoride (fluorine) to the 303(d) List.

TABLE 17. ASSESSMENTS, PLANNING LIST, AND 303(d) STATUS TABLE – BILL WILLIAMS WATERSHED

2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Boulder Creek Wilder Creek-Copper Creek 3 miles AZ15030202-005A	A&Ww Impaired FBC Impaired FC Attaining AgI Inconclusive AgL Attaining Part 5 — Impaired	Impaired by arsenic, copper, and zinc. (Note that copper and zinc impair only a portion of this reach between Wilder Creek and Butte Creek.)	Arsenic (A&Ww) — since 1988 Beryllium (FC) — since 1996 Copper (A&Ww) — since 1988 Lead (AgL) — since 1988 Manganese (AgI) — since 1988 Zinc (AgI, A&Ww) — since 1988 A TMDL has been completed and is being reviewed by EPA for approval. Coordination with the Bureau of Land Management and private owners is ongoing.	Keep arsenic, copper, and zinc on the 303(d) List. Arsenic exceeded standards in 19 of 69 samples (minimum to support a 303(d) listing is 11 exceedances in 69 samples). Dissolved copper exceeded standards in 2 of 69 samples and dissolved zinc exceeded standards in 2 of 4 samples. The minimum of 2 exceedances within 3 years was met to support a 303(d) listing of dissolved copper and dissolved zinc.
		Add to Planning List due to beryllium (see delist comment at far right) and missing core parameters.		Delist beryllium and add to the Planning List. Older data shows that beryllium exceeded standards in 5 sampling sites out of 9 during one sampling event. This does not fulfill the minimum requirement of at least 5 exceedances in 20 samples during 3 sampling events needed to support a 303(d) listing for this parameter. The laboratory reporting level for more recently collected beryllium samples was above the standard, so although beryllium was below the detection limit, these samples cannot be used to determine if standards are being attained. (Note that new beryllium standards have been submitted to EPA and when accepted, this stream will be meeting beryllium standards.)
				Delist lead and manganese. No exceedances in 69 samples for lead (attaining uses). Only 1 exceedance in 69 samples for manganese (attaining uses).
Boulder Creek Copper Creek-Burro Creek 5 miles AZ15030202-005B	A&Ww Attaining FC Attaining FBC Inconclusive AgI Inconclusive AgL Attaining Part 2 — Attaining Some Uses	Add to Planning List due to missing core parameters.	Arsenic (A&Ww) -- since1988 Beryllium (FC) -- since1996 Copper (A&Ww) -- since1988 Lead (AgL) -- since1988 Manganese (AgI) -- since 1988 Zinc (AgI, A&Ww) -- since1988	Delist all pollutants. Splitting reach at Copper Creek because samples taken during the TMDL investigation indicate that this lower portion is attaining all uses. Upper portion to remain on the list. (See comments in reach above.)
Burro Creek Boulder Creek-Black Canyon 17 miles AZ15030202-004	A&Ww Attaining FC Attaining FBC Attaining AgL Attaining Part 1 — Attaining All Uses			
Burro Creek Francis Creek-Boulder Creek 14 miles AZ15030202-008 (Unique Waters)	A&Ww Inconclusive FC Attaining FBC Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to planning list due to: 1. Turbidity exceedances (see delist comment in the far right column) and 2. Missing core parameters.	Turbidity (A&Ww) -- since1992	Delist turbidity and place on Planning List. No current turbidity data and in older data turbidity exceeded standards in 3 samples out of 10 collected. A minimum of 5 exceedances in 20 samples in needed to support a 303(d) listing of this parameter.
Butte Creek Headwaters-Burro Creek 12.8 miles AZ15030202-163	A&Ww Inconclusive FC Attaining FBC Inconclusive AgI Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to Planning List due to missing core parameters.		

TABLE 17. ASSESSMENTS, PLANNING LIST, AND 303(d) STATUS TABLE – BILL WILLIAMS WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			**303(d) LIST**	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Francis Creek headwaters-Burro Creek 24 miles AZ15030202-012 (Unique Waters)	Part 3 – Not assessed. (All uses are by default inconclusive: A&Ww, FBC, FC, AgL)	Add to the Planning List due to: 1. Turbidity exceedances(see303(d) delist comments in far right column), and 2. Lack of current monitoring data.	Turbidity (A&Ww) -- since 1992	Delist turbidity. No current monitoring data and old monitoring data used as the basis for listing would indicate that the reach is "attaining" its uses, as only 2 exceedances in 12 samples. (Note: A minimum of 3 exceedances in 10 samples is needed to be added to the Planning List and a minimum of 5 exceedances in 20 samples to support a 303(d) listing for this parameter.)
Santa Maria River South Fork-Bridle 14 miles AZ15030203-010	A&Ww Attaining FC Attaining FBC Attaining AgL Attaining Part 1 -- Attaining All Uses			
Trout Creek Cow Creek-Knight Creek 32 miles AZ15030201-014	A&Ww Attaining FC Attaining FBC Attaining AgL Attaining Part 1 -- Attaining All Uses			
Wilder Creek headwaters-Boulder Creek 15 miles AZ15030202-007	A&Ww Inconclusive FC Inconclusive FBC Inconclusive Agl Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to Planning List due to missing core parameters.		
BILL WILLIAMS WATERSHED -- LAKE ASSESSMENTS				
Alamo Lake 1,414 acres AZL15030204-0040	A&Ww Impaired FC Attaining FBC Impaired AgL Impaired Part 5 -- Impaired Trophic status not calculated	Impaired by high pH, sulfide, and dissolved oxygen Add to the Planning List to monitoring mercury in fish tissue due to potential narrative toxicity violation (see 303(d) Listing comment in far right column).	Sulfide (A&Ww) -- since 1996 High pH (A&Ww, FBC, AgL) -- since1996 Narrative toxicity standard (A&Ww) -- since1998	Keep sulfide, pH, and dissolved oxygen on the 303(d) List. Sulfide standards were exceeded in 14 out of 34 samples; pH did not meet standards in 8 out of 43 samples, and dissolved oxygen did not meet standards in 8 out of 43 samples. (Minimum to support a 303(d) listing of these parameters is 8 exceedances if 43 samples are collected.) Delist mercury. A listing for mercury would require approved narrative toxic procedures that support fish tissue screening values to protect aquatic and wildlife or human fish consumption. Such procedural documents have not yet been adopted through a public process. (Note that a fish consumption advisory has not been issued.)

*See Volume II Table 4, starting on page BW - 7, for more monitoring data and further details concerning the basis of each assessment.

TABLE 18. ASSESSMENTS, PLANNING LIST, AND 303(d) STATUS TABLE – COLORADO-GRAND CANYON WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
COLORADO-GRAND CANYON WATERSHED – STREAM ASSESSMENTS				
Beaver Dam Wash Utah border-Virgin River 10 miles AZ15010010-009	A&Ww Inconclusive FC Inconclusive FBC inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events (only 1 sampling event and need a minimum of 3 events).		
Boucher Creek California border-Colorado River 4 miles AZ15010002-017	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		
Chuar (Lava) Creek headwaters-Colorado River 8 miles AZ15010001-024	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans), and missing core parameters.	Turbidity (A&Wc) -- since 1998	Delist turbidity, as turbidity is solely due to natural background conditions. The Grand Canyon National Park Service hydrologist indicates that this remote stream does not have grazing or other anthropogenic sources of turbidity and that the turbidity can be attributed to the sandstone geology of the drainage area.
Clear Creek headwaters-Colorado River 11 miles AZ15010001-025	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans), and missing core parameters.		
Colorado River Lake Powell-Paria River 16 miles AZ14070006-001	A&Wc Attaining FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses	Add to the Planning List due to selenium (see delist comment in the far right column).	Selenium (A&Wc) -- since 1998	Delist selenium and add to the Planning List because of insufficient samples determine if meeting chronic standards (listing requires that the mean of four (4) consecutive days exceed the chronic standard). Monitoring data does not include any four-day sampling events. (Note that the geometric mean of the last four samples did not exceed the chronic standard. Therefore, chronic standards would be in compliance using the methods proposed in Arizona's surface water quality standards submitted to EPA for approval in 2002.)
Colorado River Parashant-Diamond Creek 28 miles AZ15010002-003	A&Wc Impaired FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 5 -- Impaired	Impaired by turbidity. Add to the Planning List due to missing core parameters.	Turbidity (A&Wc) -- 1998	Keep turbidity on the 303(d) List. Turbidity standards were exceeded in 15 out of 32 samples collected. (This satisfies the minimum of 6 exceedances in 32 samples to support a 303(d) listing of this parameter.)
Crystal Creek headwaters-Colorado River 17 miles AZ15010002-018	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans), and missing core parameters.		

TABLE 18. ASSESSMENTS, PLANNING LIST, AND 303(d) STATUS TABLE – COLORADO-GRAND CANYON WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Deer Creek headwaters- Colorado River 9 miles AZ15010002-019	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans), and missing core parameters.		
Garden Creek headwaters-Colorado River 3 miles AZ15010002-841	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans), and missing core parameters.		
Havasu Creek Little Coyote-Colorado River 3 miles AZ15010004-001	Part 3 -- Not assessed (All uses are inconclusive by default: A&Ww, FBC, FC)	Add to the Planning List due to: 1. Turbidity (see delist comment for the 303(d) List in the far right column), and 2. Lack of current monitoring data.	Turbidity (A&Wc) -- since 1996	Delist turbidity and add it to the Planning List. No current data. Older turbidity data had insufficient samples and exceedances to support listing as only 2 samples out of 10 collected exceeded standards. For turbidity, this is considered attaining standards. (Note, a minimum of 3 exceedances in 10 samples is needed to be added to the Planning List and 5 exceedances in 20 samples is needed to merit 303(d) listing for this parameter.)
Hermit Creek headwaters-Colorado River 6 miles AZ15010002-020	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to the Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		
Kwagunt Creek headwaters-Colorado River 9 miles AZ15010001-031	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		
Monument Creek headwaters-Colorado River 4 miles AZ15010002-845	Part 3 -- Not assessed (All uses are inconclusive by default: A&Ww, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		
Nankoweap Creek headwaters-Colorado River 9 miles AZ15010001-033	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		
National Canyon Creek headwaters-Colorado River 3 miles AZ15010002-016	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		

TABLE 18. ASSESSMENTS, PLANNING LIST, AND 303(d) STATUS TABLE – COLORADO-GRAND CANYON WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Paria River Utah border-Colorado River 29 miles AZ14070007-123	A&Wc Attaining FC Attaining FBC Attaining Part 1 -- Attaining All Uses		Beryllium (FBC) -- since1996 Turbidity (A&Wc) -- since1996 Ongoing TMDL investigation.	Delist beryllium and turbidity. No exceedances of beryllium standards out of 35 samples. TMDL investigation revealed that high turbidity is a natural condition due to natural erosion of sandstone cliffs in the drainage. Much of the Paria River in Arizona flows through a Wilderness area where BLM has implemented several strategies to protect the natural resources, such as excluding grazing and limiting the number of people entering the area. These actions will further minimize any anthropogenic sources.
Royal Arch Creek headwaters-Colorado River 6 miles AZ15010002-871	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		
Saddle Canyon Creek headwaters-Colorado River 12 miles AZ15010002-703	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		
Shinumo Creek headwaters-Colorado River 20 miles AZ15010002-029	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		
Spring Canyon Creek headwaters-Colorado River 6 miles AZ15010002-318	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		
Tapeats Creek headwaters-Colorado River 13 miles AZ15010002-696	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		
Three Springs Creek headwaters-Colorado River 1 mile AZ15010002-1180	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC, DWS, AgI, AgL)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		
Vasey's Paradise (Spring) at Colorado River 0.2 miles AZ15010001-SP01	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC)	Add to Planning List as current data did not fulfill credible data requirements (lack of Quality Assurance Plans) and missing core parameters.		

TABLE 18. ASSESSMENTS, PLANNING LIST, AND 303(d) STATUS TABLE – COLORADO-GRAND CANYON WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Virgin River Beaver Dam Wash-Big Bend Wash 10 miles AZ15010010-003	A&Ww Impaired FC Inconclusive FBC Inconclusive AgI Impaired AgL Impaired Part 5 -- Impaired	Impaired by turbidity and fecal coliform Add to the planning list due to: 1. *Escherichia coli* (exceeded standards in 1 of 5 samples) and 2. Missing core parameters.	Turbidity (A&Ww)-- since1990 (Note that most of the drainage is in Utah, so a TMDL will require a cooperative investigation with Utah.)	Turbidity and fecal coliform should be on the 303(d) List. Turbidity standards were exceeded in 8 out of 23 samples, which meet minimum of 5 exceedances in 23 samples for listing. Fecal coliform standards were exceeded in 2 out of 15 samples, and met listing requirement of 2 exceedances in 3 years.
COLORADO-GRAND CANYON WATERSHED – LAKE ASSESSMENTS				
Lake Powell 9,770 acres AZL14070006-1130	A&Ww Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive Trophic status not calculated	Add to the Planning List due to missing core parameters		

*See Volume II Table 7, starting on page CG - 7, for more monitoring data and further details concerning the basis of each assessment.

Table 19. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – COLORADO-LOWER GILA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
COLORADO-LOWER GILA WATERSHED – STREAM ASSESSMENTS				
Colorado River Hoover Dam-Lake Mohave 41 miles AZ15030101-015	A&Ww Attaining FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameters.		
Colorado River Bill Williams River-Osborne 13 miles AZ15030104-020	A&Ww Attaining FC Attaining FBC Attaining DWS Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses			
Colorado River Indian Wash-Imperial Dam 18 miles AZ15030104-001	A&Ww Attaining FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameters.		
Colorado River Main Canal-Mexico border 32 miles AZ15030107-001	A&Ww Attaining FC Attaining FBC Attaining DWS Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses		Turbidity (A&Ww) – since 1994	Delist turbidity. No turbidity exceedances in 26 samples.
Gila River Coyote Wash-Fortuna Wash 28 miles AZ15070201-003	A&Ww Attaining FC Attaining FBC Attaining AgL Attaining AgI Inconclusive Part 3 -- Attaining Some Uses	Add to thePlanning List due to boron (see delist comment for the 303(d) List in far right column)	Boron (AgI) – since 1990 Turbidity (A&Ww) – since 1994	Delist boron and add to the Planning List for further monitoring. Boron standard was exceeded in 4 samples out of 20 collected. (303(d) listing for this parameter requires at least 5 exceedances in 20 samples). Delist turbidity. No exceedances in 20 samples.

Table 19. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – COLORADO-LOWER GILA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
COLORADO-LOWER GILA WATERSHED – LAKE ASSESSMENTS				
Lake Havasu (Except London Bridge Beach) 186 acres AZL15030101-0590A	A&Ww Attaining FC Attaining FBC Attaining DWS Attaining AgL Attaining Part 1 -- Attaining All Uses Oligotrophic		Turbidity (A&Ww) -- since1996	Delist turbidity. Turbidity was found to be "attaining" standards after collecting 112 temporally/ spatially independent samples between 1996-2000. Turbidity did exceed standards during one sampling event at 5 sites; however, at 4 of these sites the median and mean values for turbidity on that date were below the standard and were therefore assessed as attaining uses.
Lake Havasu London Bridge Beach in Thompson Bay 150 acres AZL15030101-0590B	A&Ww Attaining FC Attaining FBC Attaining DWS Attaining AgL Attaining Part 1 -- Attaining All Uses Oligotrophic		*Escherichia coli* (FBC) – since 1996	Delist Escherichia coli and place on Planning List because there have been no beach closures in the past two years of data (2000 and 2001) and bacterial samples have met standards. (Note that past 303(d) listing was based on beach closures caused by high bacterial levels.)
Lake Mohave 12,850 acres AZL15030101-0960	A&Ww Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgL Inconclusive AgI Inconclusive Part 3 -- Inconclusive Oligotrophic	Add to the Planning List due to missing core parameters.		
Painted Rock Borrow Pit Lake 180 acres AZL15070201-1010	A&Ww Impaired FC Inconclusive FBC Attaining AgI Impaired AgL Impaired Part 5 -- Impaired Trophic status not calculated.	Add to the Planning List due to fish consumption advisory for DDT metabolites, toxaphene, dieldrin, and chlordane (see comment in the far right column).	DDT metabolites (FC) -- since 1988 Toxaphene (FC) -- since 1988 Dieldrin (FC) -- since 1988 Chlordane (FC) -- since 1988 Preliminary TMDL investigations ongoing through Arizona's WQARF (state Superfund) Program.	Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. Indication of narrative standards violations but applicable narrative implementation procedures have not been adopted through a public review process as required in Arizona's TMDL statute and Impaired Waters Identification Rule (see Appendix B – 49-232.F and R18-11-605.C.3).
		Impaired by low dissolved oxygen, and high fecal coliform	Dissolved oxygen (A&Ww) -- since 1992 Turbidity (A&Ww) -- since 1992 A diagnostic feasibility study was completed in 1992 that can be used to develop a TMDL. That study attributed low dissolved oxygen to the design and maintenance of the lake and drying out of the lake during droughts.	Low dissolved oxygen and fecal coliform need to be on the 303(d) List. Dissolved oxygen standards were not met in 7 samples out of 30 collected, meeting listing minimum of 6 exceedances in 30 samples. Fecal coliform standards were exceeded in 5 samples out of 21 collected, meeting the listing requirement of 2 exceedances in 3 years.
				Delist turbidity. No exceedances in 25 samples.

*See Volume II Table 10, starting on page CL - 7, for more monitoring data and further details concerning the basis of each assessment.

TABLE 20. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – LITTLE COLORADO-SAN JUAN WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
LITTLE COLORADO-SAN JUAN WATERSHED – STREAM ASSESSMENTS				
Barbershop Canyon Creek headwaters-East Clear Creek 10 miles AZ15020008-537	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to Planning List due to need for more sampling events and missing a core parameter		
Billy Creek headwaters-Show Low Creek 19 miles AZ15020005-019	A&Wc Inconclusive FC Attaining FBC Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameters.		
Buck Springs Canyon Creek headwaters-Leonard Canyon 7 miles AZ15020008-557	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. Turbidity and pH standards not being met in 1 sample out of 1 collected, 2. Missing core parameters, and 3. Need for more sampling events.		
Chevelon Creek headwaters-West Chevelon Cr. 32 miles AZ15020010-006	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. Dissolved oxygen not meeting standards in 1 sample out of 6 collected and 2. Missing core parameters.		
Chevelon Creek Black Canyon-Little Colorado R. 19 miles AZ15020010-001	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FC, FBC, AgI, AgL.)	Add to the Planning List due to: 1. Turbidity exceedances (see 303(d) delist comment in far right column), and 2. Lack of current monitoring data.	Turbidity (A&Wc) – since 1994	Delist turbidity and add to the Planning List. Insufficient turbidity samples collected. No current data. Turbidity exceeded standards in 11 samples out of 13 collected in older data. 303(d) listing requires a minimum of 5 exceedances in 20 samples for this standard.
Hall Creek headwaters-Little Colorado 14 miles AZ15020001-012	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. Dissolved oxygen not meeting standards in 1 out of 1 sample, 2. Missing core parameters, and 3. Lack of monitoring events.		
Little Colorado River Water Canyon-Nutrioso Creek 4 miles AZ15020001-010	A&Wc Inconclusive FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to turbidity exceedances (see 303(d) delist comment in the far right column).	Turbidity (A&Wc) – since 1992	Delist turbidity and add to the Planning List. Insufficient turbidity samples collected. In current data, turbidity standards were exceeded in 5 of 6 samples. In older data (collected between 1994-1995), turbidity standards were exceeded in 6 samples out of 11 collected (in 1994-2000). Even combined, the minimum of 20 samples has not been met to support this 303(d) listing.

add

TMDL approved 9/2002

TABLE 20. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – LITTLE COLORADO-SAN JUAN WATERSHED

2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Little Colorado River Nutrioso Creek-Carnero Wash 12 miles AZ15020001-009	A&Wc Inconclusive FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to turbidity exceedances (see 303(d) delist comment in the far right column).	Turbidity (A&Wc) -- since 1992	Delist turbidity and add to the Planning List. Insufficient turbidity samples collected. In current data, turbidity standards were exceeded in 5 of 7 samples, but a minimum of 5 exceedances in 20 samples is needed to support a 303(d) listing for this standard.
Little Colorado River Porter Tank-McDonalds Wash 17 miles AZ15020008-017	A&Ww Impaired FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 5 -- Impaired	Impaired by copper and silver Add to the Planning List to obtain current monitoring data.	Copper (A&Ww) -- 1992 Silver (A&Ww) -- 1992 ADEQ initiated a TMDL investigation in 2002	Keep copper and silver on the 303(d) List. Although no current monitoring data, original data used to base the 303(d) listing meets current 303(d) listing requirements, as dissolved copper exceeded standards in 9 samples in a 3-year period and dissolved silver exceeded standards in 2 samples in a 3-year period. (For these toxic parameters, a minimum of 2 exceedances in 3 years is needed to support a 303(d0 listing.)
Little Colorado River Silver Creek-Carr Wash 6 miles AZ15020002-004	A&Ww Inconclusive FC Attaining FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 2 -- Attaining Some Uses	Add to the Planning List due to beryllium, turbidity, fecal coliform, and *Escherichia coli* exceedances (see 303(d) delist comments in the far right column). Both the fecal coliform and *Escherichia coli* standard were exceeded in 1 sample out of 7 collected.	Beryllium (FBC) -- since 1994 Lead (AgL) -- since 1994 pH (A&Ww, FBC, DWS, AgI, AgL) -- since 1994 Turbidity (A&Ww) -- since 1994	Delist beryllium, lead, pH, and turbidity from the 303(d) List. Add beryllium and turbidity to the Planning List. Out of 12 samples, beryllium exceeded standards in 3 samples, turbidity exceeded standards in 8 , lead only exceeded standards in 2 samples, and pH did not exceed standards in 12 samples. Lead and pH were assessed as attaining standards with fewer than 3 exceedances in 10 samples. A minimum of 5 exceedances out of 10 samples is needed to support a 303(d) listing of either the beryllium or turbidity.
Nutrioso Creek headwaters-Picnic Creek 27 miles AZ15020001-017	A&Wc Not attaining FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 4A -- Not attaining	Add to the Planning List to evaluate the effectiveness of turbidity TMDL implementation strategies.	Turbidity (A&Wc) -- since1992 TMDL completed and approved by EPA in 2000.	Delist turbidity and add to the Planning List. A turbidity TMDL was approved by EPA in 2000. A local stakeholder is currently implementing strategies to bring the surface water into compliance with standards. This will be followed by an effectiveness monitoring phase.
Nutrioso Creek Picnic Creek-Little Colorado River 4 miles AZ15020001-015	A&Wc Not attaining FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 4A -- Not attaining	Add to the Planning List to evaluate the effectiveness of turbidity TMDL implementation strategies.	Turbidity (A&Wc) -- since 1992 TMDL completed and approved by EPA in 2000.	Delist turbidity and add to the Planning List. A turbidity TMDL was approved by EPA in 2000. A local stakeholder is currently implementing strategies to bring the surface water into compliance with standards. This will be followed by an effectiveness monitoring phase.
Porter Creek headwaters-Show Low Creek 4 miles AZ15020005-246	A&Wc Inconclusive FC Attaining FBC Inconclusive Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameters.		
Show Low Creek headwaters-Linden Wash 41 miles AZ15020005-012	A&Wc Inconclusive FC Attaining FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 2 -- Attaining Some Uses	Add to the Planning List due to: 1. Turbidity exceedances (see 303(d) delist comment in the far right column), and 2. Missing core parameters.	Dissolved oxygen (A&Wc) -- since 1992 Turbidity (A&Wc) -- since 1992	Delist dissolved oxygen and turbidity and add turbidity to the Planning List. No dissolved oxygen exceedances in 10 samples. No current turbidity data, but turbidity exceeded standards in 15 out of 16 samples in older data. However, need a minimum of 20 samples to support a 303(d) listing due to turbidity.

TMDL approved of 2002

8/12 TURB add

15/16 TURB add

TABLE 20. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – LITTLE COLORADO-SAN JUAN WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Silver Creek headwaters-Show Low Creek 34 miles AZ15020005-013	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		
Silver Creek Seven Mile Draw-Little Colorado 9 miles AZ15020005-001	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FC, FBC, AgI, AgL)	Add to the Planning List due to: 1. Turbidity exceedances (see 303(d) delist comment in far right column), and 2. Lack of current monitoring data.	Turbidity (A&Wc) -- since 1990	Delist turbidity and add to Planning List. No current data. Original turbidity data exceeded standards in 13 samples out of 13 collected; however, need a minimum of 5 exceedances in 20 samples to support a 303(d) listing of based on this standard.
Walnut Creek Pine Lake-Rainbow Lake 9 miles AZ15020005-238	A&Wc Inconclusive FC Attaining FBC Inconclusive AgL Inconclusive Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameters.		
West Fork Little Colorado River headwaters-Government Springs 8 miles AZ15020001-013A (Unique Waters)	A&Wc Inconclusive FC Inconclusive FBC Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events (need a minimum of 3 sampling events to assess).		
West Fork Little Colorado River Government Springs-Little Colorado River 1 mile AZ15020001-013B	A&Wc Attaining FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses			
Willow Creek headwaters-East Clear Creek 32 miles AZ15020008-011	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to: 1. Missing core parameters, and 2. Need to use a mercury laboratory reporting limit lower than the standard.		
Willow Spring Creek headwaters-Chevelon Creek 9 miles AZ15020010-240	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to need for more sampling events and missing core parameters.		
Woods Canyon Creek headwaters-Chevelon Creek 13 miles AZ15020010-084	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. Dissolved oxygen not meeting standards in 1 out of 2 samples, 2. Insufficient sampling events, and 3. Missing core parameters.		

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TABLE 20. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – LITTLE COLORADO-SAN JUAN WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
LITTLE COLORADO-SAN JUAN WATERSHED -- LAKE ASSESSMENTS				
Clear Creek Reservoir 29 acres AZL15020008-0340	A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Attaining Part 2 -- Attaining Some Uses Trophic status not calculated	Add to the Planning List due to: 1. Missing core parameters, and 2. Need to use a mercury laboratory detection limit lower than the standard.		
Cholla Lake 130 acres AZL15020008-0320	A&Wc Inconclusive FC Attaining FBC Inconclusive AgL Attaining Part 2 -- Attaining Some Uses Trophic status not calculated	Add to the Planning List due to 1. Missing core parameters, and 2. Need to use a mercury laboratory detection limit lower than the standard.		
Lake Mary (lower) 860 acres AZ15020015-0890	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 – Inconclusive Trophic status not calculated	Add to the Planning List due to: 1. Mercury fish consumption advisory established in 2002, and 2. Lack of current water chemistry monitoring data.		
Lake Mary (upper) 760 acres AZ15020015-0900	A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3 – Inconclusive Trophic status not calculated	Add to the Planning List due to: 1. Mercury fish consumption advisory established in 2002, and 2. Lack of current water chemistry monitoring data.		
Lee Valley Reservoir 38 acres AZL15020001-0770	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive Trophic status not calculated	Add to the Planning List due to: 1. pH not meeting standards in 2 out of 4 samples, 2. Missing core parameters, and 3. Need to use mercury laboratory detection limit lower than the standard.		
Long Lake (lower) 323 acres AZL15020008-0820	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive Trophic status not calculated	Add to the Planning List due to missing core parameters and lack of seasonal coverage.		

TABLE 20. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – LITTLE COLORADO-SAN JUAN WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Lyman Lake 1307 acres AZL15020001-0850	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 – Inconclusive Trophic status not calculated	Add to the Planning List due to missing core parameters and lack of seasonal coverage.		
McKay Reservoir 12 acres AZL15020001-0007	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive Trophic status not calculated	Add to the Planning List due to: 1. Dissolved oxygen and pH not meeting standards in 1 out of 1 sample, 2. Missing core parameters, and 3. Need for more sampling events.		
Nelson Reservoir 67 acres AZL15020001-1000	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive Trophic status not calculated	Add to the Planning List due to 1. Need for more sampling events and 2. Missing core parameters.		
Rainbow Lake 111 acres AZL15020005-1170	A&Wc Not attaining FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 4A -- Not attaining Trophic status not calculated	Add to the Planning List due to: 1. Need to valuate effectiveness of the nutrient and pH TMDL strategies, and 2. Fish kill in 1997 related to algal bloom and low dissolved oxygen may indicate a narrative toxic standards violation.	Narrative nutrients (A&Wc) pH (A&Wc, FBC, AgI, AgL) Nutrient and pH TMDL completed and approved by EPA in 2000.	Delist narrative nutrients and pH and add to the Planning List as a TMDL has been completed and approved by EPA. In the TMDL strategy implementation phase.
Woods Canyon Lake 70 acres AZL15020010-1700	A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive Trophic status not calculated	Add to the Planning List due to: 1. pH not meeting standards in 1 out of 1 sample collected, 2. Missing core parameters, and 3. Need for more sampling events.		

*See Volume II Table 13, starting on page LCR - 7, for more monitoring data and further details concerning the basis of each assessment.

TABLE 21. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – MIDDLE GILA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
MIDDLE GILA WATERSHED -- STREAM ASSESSMENT				
Agua Fria River Big Bug-Squaw Creek 16 miles AZ15070102-023	Part 3 -- Not assessed (All designated uses are inconclusive by default: A&Ww, FBC, FC, DWS, AgI, AgL.)	Add to Planning List due to: 1. Turbidity standard exceeded in old data (see comment in the far right column), and 2. Lack of current monitoring data.	Turbidity (A&Ww) -- since1996.	Delist turbidity and add it to Planning List. No current monitoring data and older turbidity data exceeded standards in 3 samples out of 17 collected. A minimum of 5 exceedances out of 20 samples is needed to support a 303(d) listing based on this standard.
Arizona Canal below last WTP intake 2 miles AZ15060106B-099B	AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		
Arizona Canal Granite Reef Dam-last WTP intake 33 miles AZ15060106B-099A	DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		
Buckeye Canal 18.8 miles AZ15070103-090	AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to DDE standard exceeded in 1 sample out of 1 collected and missing core parameters.		
Consolidated Canal Above last WTP intake 9 miles AZ15050100-074A	DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		
Dripping Spring Wash headwaters-Gila River 20 miles AZ15050100-011	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		
Eastern Canal Below last WTP intake 9 miles AZ15050100-207B	AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		
Eastern Canal Above last WTP intake 7 miles AZ15050100-207A	DWS inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		

TABLE 21. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – MIDDLE GILA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
French Gulch headwaters-Hassayampa River 10 miles AZ15070103-239	A&Ww Impaired FC Inconclusive FBC Impaired AgI Impaired AgL Impaired Part 5 -- Impaired	Impaired by copper, manganese and zinc. Add to the Planning List due to 1. Beryllium standard exceeded in 1 out of 7 samples and 2. Missing core parameters.	Cadmium (A&We, PBC) -- since1994 Copper (A&We) -- since1994 Manganese (PBC) -- since1994 pH (A&We, PBC) -- since1994 Zinc (A&We) -- since1994 TMDL investigation and sampling are ongoing.	Keep copper, manganese, and zinc on the 303(d) List. Dissolved copper exceeded standards in 80 out of 135 samples, total manganese exceeded standards in 110 out of 140 samples, and dissolved zinc exceeded standards in 66 out of 135 samples. To support a 303(d) listing, a minimum of 2 exceedances in 3 years was clearly met for dissolved copper and zinc, and a minimum of 20 exceedances (when 135 samples) was also met for listing manganese. Delist pH and cadmium. No exceedances in 141 samples.
Galena Gulch headwaters-Agua Fria River 6 miles AZ15070102-745	Part 3 – Not assessed (All designated uses are inconclusive by default: A&Ww, PBC, AgL)	Add to the Planning List due to 1. Cyanide standard exceeded in older data (see 303(d) delist comment in far right column), and 2. Lack of current monitoring data.	Cyanide (A&Ww) – since 1992	Delist cyanide and add it to the Planning List. No current cyanide data. Sampling Analysis Plans for the original sampling sites (1990-1991) could not be located and there is some question as to whether the sample locations were representative of in-stream water quality conditions; therefore, older data could not meet current credible data requirements.
Gila River Dripping Spring-San Pedro River 11 miles AZ15050100-009	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		
Gila River San Pedro River-Mineral Creek 20 miles AZ15050100-008	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. Turbidity standard exceeded in older data (see 303(d) delist comment in the far right column), 2. Missing core parameters. 3. Need mercury samples analyzed with a laboratory reporting limit below applicable standards.	Turbidity (A&Ww) – since 1992	Delist turbidity and add it to the Planning List. No current monitoring data. Older turbidity data exceeded standards in 2 samples out of 3 collected, but need a minimum of 5 exceedances in 20 samples to support a 303(d) listing of turbidity.
Gila River Mineral Creek-Donnelly Wash 16 miles AZ15050100-007	Part 3 – Not assessed (All designated uses are inconclusive by default: A&Ww, FC, FBC, AgI, AgL)	Add to the Planning List due to: 1. Copper and turbidity (see 303(d) delist comment in the far right column), and 2. Lack of current monitoring data.	Copper (A&Ww) -- 1992 Turbidity (A&Ww) – 1992	Delist copper and turbidity and add to the Planning List. No current monitoring data. Older data was related to a spill (on Mineral Creek) that was subsequently cleaned-up, and therefore, would not meet current 303(d) listing requirements. Also, actions on Mineral Creek should mitigate further copper being transported into this section of the Gila River.
Gila River Ashurst-Hayden-Florence WWTP 13 miles AZ15050100-003B	A&We Inconclusive PBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. Copper standard exceeded in 1 out of 2 samples collected, 2. Missing core parameters, and 3. Insufficient sampling events.		

TABLE 21. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – MIDDLE GILA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Gila River Salt River-Agua Fria River 4 miles AZ15070101-015	A&Wedw Inconclusive PBC Inconclusive FC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. A fish consumption advisory for DDT, toxaphene, dieldrin, and chlordane is in effect (see comment in far right column) and 2. Lack of current water chemistry monitoring data.	Narrative toxicity standard -- Fish consumption advisory due to DDT, toxaphene, dieldrin and chlordane (FC) -- since1988. Ongoing TMDL investigations.	Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. The existing fish consumption advisory for these pesticides indicates a narrative standard violation but applicable narrative implementation procedures have not been adopted through a public review process as required in Arizona's TMDL statute (Appendix B--49-232.F). Until the procedures are adopted, ADEQ must place the water on the Planning List (Appendix B -- R18-11-605.C.3).
Gila River Agua Fria River-Waterman Wash 12 miles AZ15070101-014	A&Wedw Inconclusive FC Inconclusive PBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. A fish consumption advisory for DDT, toxaphene, dieldrin, and chlordane is in effect (see comment in far right column) and 2. Missing core parameters	Narrative toxicity standard -- Fish consumption advisory due to DDT, toxaphene, dieldrin and chlordane (FC) -- since1988. Ongoing TMDL investigations.	Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. The existing fish consumption advisory for these pesticides indicates a narrative standard violation but applicable narrative implementation procedures have not been adopted through a public review process as required in Arizona's TMDL statute (Appendix B--49-232.F). Until the procedures are adopted, ADEQ must place the water on the Planning List (Appendix B -- R18-11-605.C.3).
Gila River Waterman Wash-Hassayampa R. 14 miles AZ15070101-010	A&Wedw Inconclusive PBC Inconclusive FC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. A fish consumption advisory for DDT, toxaphene, dieldrin, and chlordane is in effect (see comment in far right column) and 2. Lack of current water chemistry monitoring data.	Narrative toxicity standard -- Fish consumption advisory due to DDT, toxaphene, dieldrin and chlordane (FC) -- since1988. Ongoing TMDL investigations.	Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. The existing fish consumption advisory for these pesticides indicates a narrative standard violation but applicable narrative implementation procedures have not been adopted through a public review process as required in Arizona's TMDL statute (Appendix B--49-232.F). Until the procedures are adopted, ADEQ must place the water on the Planning List (Appendix B -- R18-11-605.C.3).
Gila River Hassayampa River-Centennial Wash 7 miles AZ15070101-009	A&Wedw Inconclusive PBC Inconclusive FC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. A fish consumption advisory for DDT, toxaphene, dieldrin, and chlordane is in effect (see comment in far right column) and 2. Lack of current water chemistry monitoring data.	Narrative toxicity standard -- Fish consumption advisory due to DDT, toxaphene, dieldrin and chlordane (FC) -- since1988. Ongoing TMDL investigations.	Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. The existing fish consumption advisory for these pesticides indicates a narrative standard violation but applicable narrative implementation procedures have not been adopted through a public review process as required in Arizona's TMDL statute (Appendix B--49-232.F). Until the procedures are adopted, ADEQ must place the water on the Planning List (Appendix B -- R18-11-605.C.3).
Gila River Centennial Wash-Gillespie Dam 5 miles AZ15070101-008	A&Ww Attaining FC Inconclusive FBC Attaining AgI Impaired AgL Attaining Part 5 -- Impaired	Impaired by boron Add to the Planning List due to: 1. Beryllium standard exceeded in 4 out of 11 samples, 2. Fish consumption advisory for DDT, toxaphene, dieldrin, and chlordane (see comments in the far right column),	Boron (AgI) -- since1992 Fecal Coliform (A&Wedw) -- since1994 Selenium (A&Wedw) -- since 1998 Turbidity (A&Wedw) -- since 1994	Keep boron on the 303(d) List. Boron standard exceeded in 16 samples out of 21 samples collected. Delist fecal coliform, selenium, and turbidity. Fecal coliform exceeded standards in 3 out of 25 samples and selenium exceeded standards in 3 of 22 samples collected, but neither standard was exceeded in at least 2 samples in a 3-year period required to support 303(d) listing. Turbidity exceeded standards in 3 samples out of 25, that met the minimum of 5 exceedances in 25 samples needed to support a 303(d) turbidity listing.

TABLE 21. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – MIDDLE GILA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
			Narrative toxicity standard -- Fish consumption advisory due to DDT, toxaphene, dieldrin and chlordane (FC) -- since1988. Ongoing TMDL investigations.	Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. The existing fish consumption advisory for these pesticides indicates a narrative standard violation but applicable narrative implementation procedures have not been adopted through a public review process as required in Arizona's TMDL statute (Appendix B– 49-232.F). Until the procedures are adopted, ADEQ must place the water on the Planning List (Appendix B – R18-11-605.C.3). Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. Applicable narrative toxicity implementation procedures have not yet been documented and adopted using a public review and comment process as required in new Arizona TMDL statute (see Appendix A – 49-232.F).
Gila River Gillespie Dam-Rainbow Wash 5 miles AZ15070101-007	A&Ww Inconclusive FBC Inconclusive FC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. A fish consumption advisory for DDT, toxaphene, dieldrin, and chlordane is in effect (see comment in far right column) and 2. Lack of current water chemistry monitoring data.	Narrative toxicity standard -- Fish consumption advisory due to DDT, toxaphene, dieldrin and chlordane (FC) -- since1988. Ongoing TMDL investigations.	Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. The existing fish consumption advisory for these pesticides indicates a narrative standard violation but applicable narrative implementation procedures have not been adopted through a public review process as required in Arizona's TMDL statute (Appendix B– 49-232.F). Until the procedures are adopted, ADEQ must place the water on the Planning List (Appendix B – R18-11-605.C.3).
Gila River Rainbow Wash-Sand Tank 17 miles AZ15070101-005	A&Ww Inconclusive FBC Inconclusive FC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. A fish consumption advisory for DDT, toxaphene, dieldrin, and chlordane is in effect (see comment in far right column) and 2. Lack of current water chemistry monitoring data.	Narrative toxicity standard -- Fish consumption advisory due to DDT, toxaphene, dieldrin and chlordane (FC) -- since1988. Ongoing TMDL investigations.	Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. The existing fish consumption advisory for these pesticides indicates a narrative standard violation but applicable narrative implementation procedures have not been adopted through a public review process as required in Arizona's TMDL statute (Appendix B– 49-232.F). Until the procedures are adopted, ADEQ must place the water on the Planning List (Appendix B – R18-11-605.C.3).
Gila River Sand Tank-Painted Rocks Reservoir 19 miles AZ15070101-001	A&Ww Inconclusive FBC Inconclusive FC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. A fish consumption advisory for DDT, toxaphene, dieldrin, and chlordane is in effect (see comment in far right column) and 2. Lack of current water chemistry monitoring data.	Narrative toxicity standard -- Fish consumption advisory due to DDT, toxaphene, dieldrin and chlordane (FC) -- since1988. Ongoing TMDL investigations.	Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. The existing fish consumption advisory for these pesticides indicates a narrative standard violation but applicable narrative implementation procedures have not been adopted through a public review process as required in Arizona's TMDL statute (Appendix B– 49-232.F). Until the procedures are adopted, ADEQ must place the water on the Planning List (Appendix B – R18-11-605.C.3).
Grand Canal 5 miles AZ15070102-250	AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		
Hassayampa River headwaters-Copper Creek 11 miles AZ15070103-007A	A&Ww Impaired FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 5 – Impaired	Impaired by zinc Add to the Planning List due to copper standards being exceeded (see 303(d) delisting comment in far right column).	Cadmium (AgI, AgL, A&Ww) -- since 1992 Copper (A&Ww) -- since 1992 Zinc (A&Ww) -- since 1992 Draft zinc TMDL has completed public review and is to be submitted to EPA in 2002.	Keep zinc on the 303(d) List. Dissolved zinc standard was exceeded in 3 samples out of 3 collected, that meets the 303(d) listing requirement of at least 2 exceedances in 3 years for this toxic parameter. Delist cadmium and copper and add copper to the Planning List. Dissolved cadmium did not exceed standards in 3 samples and dissolved copper exceeded standard in only 1 of 3 samples. (Minimum to support 303(d) listing for these parameters is 2 exceedances in 3 years).

TABLE 21. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – MIDDLE GILA WATERSHED

2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Hassayampa River Copper Creek-Blind Indian Creek 20 miles AZ15070103-007B	A&Ww Inconclusive FC Attaining FBC Attaining AgI Inconclusive AgL Inconclusive Part 2 – Attaining Some Uses	Add to the Planning List due to: 1. Beryllium standard exceeded in 1 out of 1 sample, and 2. Fecal coliform standard exceeded in 1 out of 8 samples.	Cadmium (AgI, AgL, A&Ww) – 1992 Copper (A&Ww) – 1992 Zinc (A&Ww) – 1992 Ongoing TMDL investigation. Original reach is being split at Copper Creek based on monitoring data and extent of impairment, and this lower section is not impaired.	Delist cadmium, copper, and zinc from the 303(d) List. Cadmium and zinc did not exceed standards in 12 samples and copper exceeded the standards only once in 12 samples (attaining uses). (See other portion of this reach)
Hassayampa River Cottonwood Creek-Martinez Wash 32 miles AZ15070103-004	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgI Attaining AgL Inconclusive Part 2 – Attaining Some Uses	Add to the Planning List due to 1. Arsenic standard exceeded in 1 out of 7 samples, 2. Beryllium standard exceeded in 2 out of 2 samples, 3. Copper standard exceeded in 1 out of 7 samples, 4. *E. coli* standard exceeded in 1 of 6 samples, 5. Lead standard exceeded in 1 of 7 samples, and 6. Turbidity standard exceeded in 2 of 7 samples.	Turbidity - 1992	Delist turbidity and add to Planning List. Turbidity samples exceeded standards in only 2 of 7 samples collected. A minimum of 5 exceedances in 20 samples is needed to support a 303(d) listing of this parameter.
Hassayampa River Buckeye Canal-Gila River 2 miles AZ15070103-001B	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 –Inconclusive	Add to the Planning List due to: 1. A fish consumption advisory for DDT, toxaphene, dieldrin, and chlordane(see 303(d) delist comment in far right column) 2. DDE exceeded standards (see 303(d) comment in far right column). 3. Missing core parameters.	Narrative toxicity standard – Fish consumption advisory due to DDT, toxaphene, dieldrin and chlordane (FC) – since1988. Ongoing TMDL investigations.	Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. The existing fish consumption advisory for these pesticides indicates a narrative standard violation but applicable narrative implementation procedures have not been adopted through a public review process as required in Arizona's TMDL statute (Appendix B–49-232.F). Until the procedures are adopted, ADEQ must place the water on the Planning List (Appendix B – R18-11-605.C.3). DDE exceeded standards in 10 out of 10 water samples collected by USGS, but did not meet the minimum of 20 samples required for this parameter to remain on the 303(d) List. (Note, the DDE values did not exceed the acute Aquatic and Wildlife standards.)
Lynx Creek headwaters-Agua Fria River 21 miles AZ15070102-033	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 – Inconclusive	Add to the Planning List due to: 1. Cadmium and copper exceeding standards in 1 out of 1 sample, 2. Lack of sampling events, and 3. Missing core parameters		
Mineral Creek headwaters-Devils Canyon 9 miles AZ15050100-012A	Part 3 – Not assessed (All designated uses are inconclusive by default: A&Ww, FC, FBC, AgL.)	Add to the Planning List due to lack of monitoring data in this new segment (see 303(d) delist comment in the far right column).	Beryllium (FC) – since 1992 Copper (A&Ww AgL) – since 1992 pH (A&Ww, FBC, AgI, AgL) – since 1992 Zinc (A&Ww) – since 1992 Original reach is split for hydraulic reasons and to better define the extent of contamination. Sampling is ongoing in this upper watershed.	Delist this section of the original reach and place on the Planning List. After segmenting this reach due to hydraulic reasons, there is no monitoring data to assess this ephemeral reach as all data available for this assessment was collected in the lower reach (see below).

TABLE 21. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – MIDDLE GILA WATERSHED

2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Mineral Creek Devils Canyon-Gila River 10 miles AZ15050100-012B	A&Ww Impaired FC Impaired FBC Inconclusive AgL Impaired Part 5 – Impaired	Impaired by beryllium, copper, zinc, and pH Add to the Planning List due to missing core parameters	Beryllium (FC) -- since 1992 Copper (A&Ww, AgL) – since 1992 pH (A&Ww, FBC, AgI, AgL) -- since 1992 Zinc (A&Ww) -- since 1992 A compliance program consent decree has ensured substantial technology-based actions to eliminate exceedances. Preliminary TMDL investigation and historic data collection are underway.	Keep beryllium, copper, pH, and zinc on the 303(d) List. Beryllium exceeded standards in 67 out of 169 samples, copper exceeded in 65 out of 170 samples, and zinc exceeded standards in 36 out of 170 samples. Low pH values were limited to the tunnel inlet site, where 10 out of 33 did not meet standards.
Queen Creek headwaters-Superior Mine WWTP 9 miles AZ15050100-014A	A&Ww Impaired FC Attaining PBC Inconclusive DWS Inconclusive AgL Attaining Part 5 – Impaired	Impaired by copper. Add to the Planning List due to missing core parameters.		Add copper to the 303(d) List. Dissolved copper exceeded standards in 2 samples out of 2 collected, and met the 303(d) listing requirement of at least 2 exceedances in 3 years for this toxic parameter.
Queen Creek Superior Mine WWTP-Potts Canyon 6 miles AZ15050100-014B	A&Wedw Inconclusive PBC Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		
Salt River 23rd Ave WWTP-Gila River 14 miles AZ15060106B-001D	A&Wedw Inconclusive FC Inconclusive PBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. A fish consumption advisory for DDT, toxaphene, dieldrin, and chlordane is in effect (see comment in far right column) and 2. Lack of current water chemistry monitoring data.	Narrative toxicity standard -- Fish consumption advisory due to DDT, toxaphene, dieldrin and chlordane (FC) -- since1988. Ongoing TMDL investigations.	Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. The existing fish consumption advisory for these pesticides indicates a narrative standard violation but applicable narrative implementation procedures have not been adopted through a public review process as required in Arizona's TMDL statute (Appendix B-- 49-232.F). Until the procedures are edopted, ADEQ must place the water on the Planning List (Appendix B – R18-11-605.C.3).
			pH (A&Wedw, PBC, AgI, AgL) – since 1994	Delist pH. No exceedances in 24 samples (attaining uses).
South Canal 10 miles AZ15060106B-180	DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		
Tempe Canal 1 mile AZ15050100-115	DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		

add

TABLE 21. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – MIDDLE GILA WATERSHED

2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Turkey Creek headwaters-Poland Creek 30 miles AZ15070102-036	A&Ww Impaired FBC Inconclusive FC Inconclusive AgI Inconclusive AgL Inconclusive Part 5 -- Impaired	Impaired by cadmium, copper and zinc.	Arsenic (FBC) -- since 1992 Cadmium (AgI, AgL, FBC, FC) -- since 1992 Copper (AgI, AgL) -- since 1992 Cyanide (A&Ww, AgL) -- since 1992 Lead (AgL) -- since 1992 Zinc (FBC, FC, AgI, AgL) -- since1992	Delist arsenic, cyanide, and lead and place arsenic and lead on the Planning List. No cyanide exceedances in 15 samples. Arsenic exceeded standards in only 3 out of 5 samples and lead exceeded standards in only 1 of 5 samples (303(d) listing requires a minimum of 5 exceedances and 20 samples for the arsenic and lead standards exceeded).
		Add to the Planning List due to: 1. Arsenic standard exceeded in 3 out of 5 samples, 2. Lead standard exceeded in 1 out of 5 samples (see 303(d) delist comment in the far right column) and 3. Missing core parameters.	Ongoing TMDL investigation. Coordinating with the US Forest Service. ADEQ expects to submit a TMDL and formal report to EPA in 2002 to support delisting some metals.	Keep cadmium, copper, and zinc on the 303(d) List. Among 5 samples collected, dissolved cadmium exceeded standards in 2 samples, dissolved copper standard was exceeded in 3 samples, and dissolved zinc was exceeded in 3 samples and met the 303(d) listing requirement for these toxic parameters of at least 2 exceedances in 3 years.
Western Canal 15 miles AZ15060106B-262	AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		
Western Canal 10 miles AZ15050100-990	DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters.		
MIDDLE GILA WATERSHED -- LAKE ASSESSMENT				
Alvord Park Lake 27 acres AZL15060106B-0050	A&Ww Inconclusive FC Attaining PBC Inconclusive Part 2 -- Attaining some Uses Trophic status not calculated	Add to the Planning List due to: 1. Beryllium exceeded standard in 1 sample out of 1 collected and 2. Missing core parameters (bacteria samples).		
Chaparral Lake 13 acres AZL15060106B-0300	A&Ww Inconclusive FC Attaining PBC Inconclusive AgI Inconclusive Part 2 -- Attaining Some Uses Trophic status not calculated	Add to the Planning List due to: 1. pH not meeting standards in 3 out of 12 samples and 2. Missing core parameters (bacteria samples).		
Cortez Park Lake 2 acres AZL15060106B-0410	A&Ww Inconclusive FC Attaining PBC Inconclusive AgI Inconclusive Part 2 -- Attaining Some Uses Trophic status not calculated	Add to the Planning List due to: 1. pH not meeting standards in 6 of 12 samples (a minimum of 5 exceedances in 20 samples is needed to support a 303(d) listing), 2. Fish kill in 1999 related to an algal bloom is evidence of a narrative standards violation, and 3. Missing core parameters.		maybe 4B TX 2001 Texas drained, dredged & deepened to fix problems, outfits new water

OK di. P, Hds.

OK

6/12 pH

Fish kill

? add

no add

4B

TABLE 21. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – MIDDLE GILA WATERSHED

2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Fain Lake 10 acres AZL15070101-0005	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive Trophic status not calculated	Add to the Planning List due to: 1. Missing core parameters and 2. Need mercury samples analyzed with a laboratory reporting limit below the standards.		
Lake Pleasant 2042 acres AZL15070102-1100	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive Oligotrophic	Add to the Planning List due to: 1. Fish kill in 1997 due to resuspended organic sediments in flood waters may be evidence of a narrative standards violation, and 2. Missing core parameters.		
Lynx Lake 50 acres AZL15070102-0860	A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Attaining Part 2 -- Attaining Some Uses Trophic status not calculated	Add to the Planning List due to missing core parameters.		
Painted Rock Reservoir 100 acres AZL15070101-1020	A&Ww Inconclusive FBC Inconclusive FC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive Trophic status not calculated	Add to the Planning List due to: 1. A fish consumption advisory for DDT, toxaphene, dieldrin, and chlordane is in effect (see comment in far right column) and 2. Lack of current water chemistry monitoring data.	Narrative toxicity standard -- Fish consumption advisory due to DDT, toxaphene, dieldrin and chlordane (FC) -- since1988. Ongoing TMDL investigations.	Delist DDT, toxaphene, dieldrin, chlordane and add to the Planning List. The existing fish consumption advisory for these pesticides indicates a narrative standard violation but applicable narrative implementation procedures have not been adopted through a public review process as required in Arizona's TMDL statute (Appendix B - 49-232.F). Until the procedures are adopted, ADEQ must place the water on the Planning List (Appendix B – R18-11-605.C.3).
Papago Park Ponds 6 acres AZL15060106B-1030	A&Ww Attaining FC Attaining PBC Inconclusive Part 2 -- Attaining Some Uses Trophic status not calculated	Add to the Planning list due to Missing core parameters.		
Tempe Town Lake 220 acres AZL15060106B-1588	A&We Not Attaining PBC Not Attaining Part 4B -- Not attaining Trophic status not calculated	Add to the Planning List due to pH standards being exceeded in 169 out of 623 samples before beginning technology-based treatment of the lake to control algal growth. Only two months of data since treatment was initiated, but pH standards are being met. Continue ongoing monitoring by the city.		??

*See Volume II Table 16, starting on page MG - 7, for more monitoring data and further details concerning the basis of each assessment.

TABLE 22. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – SALT RIVER WATERSHED

2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
SALT WATERSHED -- STREAM ASSESSMENTS				
Beaver Creek headwaters-Black River 13 miles AZ15060101-008	Part 3 -- Not assessed. (All uses are inconclusive by default: A&Wc, FBC, FC, AgI, AgL).	Add to the Planning List due to: 1. Old turbidity exceedances 2. Lack of current data (see 303(d) delist comment in the far right column). 3. Missing core parameters.	Phosphorus (total) (A&Wc)-- since 1994 Turbidity (A&Wc) -- since 1994 Ongoing monitoring.	Delist phosphorus. No current monitoring data. Original data did not exceed single sample maximum standards and had insufficient phosphorus samples to support application of annual mean standard. (Surface water standards define an annual mean as the mean of at least 3 monthly means during a 12 month period. It takes more than one sample to define a monthly mean.) Delist turbidity. No current monitoring data. Original data exceeded the turbidity standard in 2 out of 4 samples, which does not meet the minimum of 5 exceedances in 20 samples to support a 303(d) listing for turbidity.
Bloody Tanks Wash Schultz Ranch-Miami Wash 7 miles AZ15060103-034B	Part 3 -- Not assessed. (All designated uses are inconclusive by default: A&We, PBC, and AgL)	Add to the Planning List due to 1. Copper exceedances (see 303(d) delist comment in the far right column) and 2. Lack of current monitoring data.	Copper (A&We) -- since 1988	Delist copper. No current data and cannot locate original data used to support listing (this wash was listed along with Pinal Creek and Miami Wash in 1988.). Credible data was collected by EPA in 1993 at 4 sites showing copper exceedances, but during only one sampling event. Need a minimum of 2 exceedances in a three-year period, during at least 2 sampling events to merit a 303(d) listing.
Canyon Creek headwaters-Oak Creek 9 miles AZ15060103-014	Part 3-- Not assessed. (All designated uses are inconclusive by default: A&Wc, FBC, FC, DWS, AgI, AgL).	Add to the Planning List to provide current monitoring data.	Turbidity (A&Wc) -- since 1994	Delist turbidity. No current data. Older data exceeded the turbidity standard in only 3 of 23 samples. Need a minimum of 5 exceedances if 23 samples to support a 303(d) listing, and based on current assessment criteria reach would be attaining its designated uses.
Cherry Creek headwaters-Salt River 61 miles AZ15060103-015	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3-- Inconclusive	Add to the Planning List due to missing core parameters and lack of sampling events.		
Christopher Creek headwaters-Tonto Creek 8 miles AZ15060105-353	A&Wc Impaired FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 5 -- Impaired	Impaired by turbidity.		Add turbidity to the 303(d) List. Turbidity exceeded standards in 9 samples out of 32 collected. The minimum to support a 303(d) listing for turbidity is 6 exceedances when 32 samples are collected.
		Add to the Planning List due to: 1. *Escherichia coli* exceedance in 1996 and 2000, and 2. Missing core parameters	Nitrogen (Total) (A&Wc) -- since 1998. Additional sampling is ongoing. A TMDL report supporting the delist of nitrogen is to be submitted to EPA in 2002.	Delist nitrogen. Neither the single sample maximum nor the annual mean standard was exceeded. (Attainment also confirmed by reviewing data collected in the summer of 2002, data that were not included in this assessment.)
Fish Creek headwaters-Black River 14 miles AZ15060101-032	A&Ww Inconclusive FBC Inconclusive FC Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to dissolved copper exceedance in 1 sample out of 1 collected.		

TABLE 22. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – SALT RIVER WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Haunted Canyon headwaters-Pinto Creek 7 miles AZ15060103-879	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3-- Inconclusive	Add to the Planning List due to: 1. Beryllium exceedance in 1 sample of 1 collected, 2. Missing core parameters, and 3. Insufficient sampling events.		
Pinal Creek Radium-Jesse Lane 9 miles AZ15060103-280C	Part 3 – Not assessed (All designated uses are inconclusive by default: A&Ww, FC, FBC, AgL.)	Add to the Planning List. Need monitoring data in this segment, however, collecting samples may be difficult because the segment is ephemeral.	Copper (A&We) -- since 1988 Manganese (FBC) – since 1988 pH (A&We, AgL) – since 1988 Zinc (A&We) -- since1988 See other segment — AZ15060103-280D	Delist all pollutants. New segmentation of the stream due to hydrological change at Jesse Lane. All old and new monitoring data occurred in the lower segment (AZ15060103-280D). (See assessment and new treatment described in the segment below which has modified where perennial flow begins.)
Pinal Creek Jesse Lane-Salt River 6 miles AZ15060103-280D	A&Ww Attaining FC Attaining FBC Attaining AgI Attaining Part 1 – Attaining		~~Manganese~~ (FBC) -- since 1988 ~~pH~~ -- since 1988 Ongoing investigation and corrective actions being taken through the Arizona WQARF (Superfund) Program.	Delist all pollutants. All surface and subsurface flow is intercepted at Jesse Lane and water is sent to a treatment plant. Treated effluent discharge is monitored at several sites. No further exceedances have occurred after a few months of treatment. Ongoing monitoring at several sites. All designated uses are attaining!
Pinto Creek headwaters-Ripper Spring 20 miles AZ15060103-018A	A&Ww Not attaining FC Attaining FBC Inconclusive AgI Attaining AgL Attaining Part 4A -- Not attaining	Add to the Planning List to determine copper TMDL implementation strategies effectiveness and to collect missing core parameters.	Copper (A&Ww) – since 1988 Copper Phase I TMDL approved by EPA in 2001. ADEQ is conducting additional monitoring for a Phase II copper TMDL.	Delist copper and add to Planning List. A copper TMDL was completed and approved by EPA in 2001. In the TMDL strategy implementation and monitoring phase.
Pinto Creek Ripper Spring-Roosevelt Lake 19 miles AZ15060103-018B	A&Ww Attaining FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses		Copper A&Ww – since 1988	Split original reach at Ripper Spring. This lower segment is attaining its designated uses and should be removed from the 303(d) List (see upper segment).
Salt River Pinal Creek-Roosevelt Lake 8 miles AZ15060103-022	A&Ww Attaining FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses		Turbidity (A&Ww) – since 1990	Delist turbidity. Turbidity exceeded standard in only 1 of 13 samples; therefore, assessed as attaining uses for this parameter.
Salt River Saguaro Lake-Verde River 10 miles AZ15060106A-003	A&Ww Attaining FC Attaining FBC Attaining DWS Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses			

OK

OK

TABLE 22. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – SALT RIVER WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Spring Creek headwaters-Tonto Creek 20 miles AZ15060105-010	A&Wc Attaining FC Attaining FBC Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameters.		
Tonto Creek headwaters-Haigler Creek 17 miles AZ15060105-013	A&Wc Impaired FC Inconclusive FBC Attaining AgI Attaining AgL Attaining Part 5 -- Impaired	Impaired by turbidity Add to the Planning List due to: 1. Beryllium standard exceeded in 1 sample, 2. Escherichia coli exceedances.	Escherichia coli (FBC) – since 1998 Nitrogen (total) (A&Wc) – since 1996 Phosphorus (total) (A&Wc) – since 1996 Additional sampling is ongoing. Target completion date for draft nutrient and bacterial TMDLs is September 2002.	Add turbidity to the 303(d) List. Turbidity exceeded standards in 23 out of 43 samples collected, that meets the minimum of 8 exceedances if 43 samples to support a 303(d) listing. Delist nitrogen and phosphorus. Single sample maximum standards were not exceeded in 44 samples. Delist Escherichia coli. Exceeded standards in only 2 of 41 samples and exceedances were spread over 4 years (Need a minimum of 2 exceedances within a 3-year period to support a 303(d) listing).
Tonto Creek Rye Creek-Gun Creek 5 miles AZ15060105-008	A&Wc Impaired FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 5 -- Impaired	Impaired by turbidity	Turbidity (A&Wc) – since 1990.	Keep turbidity on the 303(d) List. Turbidity standards were exceeded in 7 samples out of 20 collected. This meets the minimum of 5 exceedances in 20 samples for this parameter.
West Fork Black River headwaters-Black River 15 miles AZ15060101-048	Part 3 -- Not assessed (All uses are inconclusive by default: A&Wc, FBC, FC, DWS, AgI, AgL.)	Add to Planning List due to: 1. Turbidity (see 303(d) delist comment in the far right column), and 2. Lack of current monitoring data.	Turbidity (A&Wc) – since 1990	Delist turbidity and add to Planning List. No current data and older turbidity data exceeded standards in 2 samples out of 4 collected. For this parameter, a minimum of 5 exceedances in 20 samples is needed to support a 303(d) listing.
SALT WATERSHED -- LAKE ASSESSMENTS				
Apache Lake 2191 acres AZL15060106A-0070	A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3-- Inconclusive Oligotrophic	Add to the Planning List due to missing core parameters.		
Big Lake 440 acres AZL15060101-0160	A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3-- Inconclusive Trophic status not calculated	Add to the Planning List due to missing core parameters.		

OK

TABLE 22. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – SALT RIVER WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	Designated Use Assessments* 5-Part Listing Lake Trophic Status	Conclusions Pollutants of Concern	STATUS OF THE 1998 303(d) LIST	RECOMMENDATIONS FOR 2002 303(d) LIST
Big Lake 440 acres AZL15060101-0160	A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3-- Inconclusive Trophic status not calculated	Add to the Planning List due to missing core parameters.		
Crescent Lake 157 acres AZL15060101-0420	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3-- Inconclusive Trophic status not calculated	Add to the planning List due to: 1. pH not meeting standards in 6 of 8 samples collected (need a minimum of 20 samples with 5 exceedances to support a 303(d) listing) and 2. Missing core parameters.		
Lake Sierra Blanca 31 acres AZL15060101-1390	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3-- Inconclusive Trophic status not calculated	Add to the Planning List due to a fish kill in 1998 related to weed growth and high pH which may be evidence of narrative standards violations.		review Vol. II data
Roosevelt Lake 18,345 acres AZL15060103-1240	A&Ww Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3-- Inconclusive Oligotrophic - Dystrophic	Add to the Planning List due to missing core parameters.		
Saguaro Lake 1022 acres AZL15060106A-1290	A&Wc Attaining FC Attaining FBC Inconclusive DWS Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses Oligotrophic	Add to the Planning List due to missing core parameters.		

add 6/8 pH

Do other data

*See Volume II Table 19, starting on page SR - 7, for more monitoring data and further details concerning the basis of each assessment.

TABLE 23. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – SAN PEDRO-WILLCOX PLAYA-RIO YAQUI WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
SAN PEDRO-WILLCOX PLAYA-RIO YAQUI WATERSHED -- STREAM ASSESSMENTS				
Aravaipa Canyon Creek Stowe Gulch-Wilderness boundary 16 miles AZ15050203-004B (Unique Waters)	A&Ww Attaining FC Attaining FBC Attaining DWS Attaining AgL Attaining Part 1 -- Attaining All Uses			USFWS 1995 data G/H > 2ppm ww Pb in tissue mean = 1.95; Geomean = 1.51
Aravaipa Canyon Creek Wilderness boundary-San Pedro R. 13 miles AZ15050203-004C	A&Ww Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters and lack of sampling events		
Bass Canyon Creek headwaters-Hot Springs Canyon 12 miles AZ15050203-899	A&Ww Attaining FC Attaining FBC Attaining Part 1 -- Attaining All Uses			
Buehman Canyon headwaters-end of Unique Waters 10 miles AZ15050203-010A (Unique Waters)	A&Ww Attaining FC Inconclusive FBC Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to beryllium standard being exceeded in 8 samples out of 8 collected. Note: beryllium concentrations will meet proposed beryllium standard submitted to EPA for approval in 2002.		new Be std approved
Copper Creek headwaters-Prospect Canyon 7 miles AZ15050203-022A	A&Ww Attaining FC Attaining FBC Attaining DWS Attaining AgL Attaining Part 1 -- Attaining All Uses			
Double R Canyon Creek headwaters-Bass Canyon Creek 5 miles AZ15050203-902	A&Ww Inconclusive FC Attaining FBC Inconclusive DWS Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to dissolved oxygen not meeting standards in 2 samples out of 3 collected, and missing core parameters.		
Grant Creek headwaters-High Creek 13 miles AZ15050201-033	A&Wc Attaining FC Attaining FBC Inconclusive DWS Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to Planning List due to missing core parameters.		

NO!

OK

TABLE 23. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – SAN PEDRO-WILLCOX PLAYA-RIO YAQUI WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Hendricks Gulch headwaters-Mule Gulch 0.5 miles AZ15080301-335	A&We Inconclusive PBC Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to dissolved copper and low pH not meeting standards in 1 out of 3 samples and missing core parameters. To be addressed as part of Mule Gulch TMDL.		
Hot Springs Canyon Creek headwaters-San Pedro River 26 miles AZ15050203-013	A&Ww Attaining FC Attaining FBC Attaining AgL Attaining Part 1 -- Attaining All Uses			
Mule Gulch headwaters-WWTP Bisbee 4 miles AZ15080301-090A	A&Ww Impaired FC Inconclusive PBC Inconclusive AgI Inconclusive AgL Inconclusive Part 5 -- Impaired	Impaired by copper and zinc Add to the Planning List due to pH not meeting standards (see 303(d) delist comment in the far right column).	Copper (A&Ww, AgL) -- since 1990 pH (A&Ww, PBC, AgI, AgL) -- since 1990 Zinc (A&Ww) -- since1990 Sampling has been completed. Modeling is being reviewed. Additional sampling is being considered to support development of site-specific standards.	Keep copper and zinc on the 303(d) List. Dissolved copper exceeded standards in 12 samples out of 16 and dissolved zinc exceeded standards in 7 samples out of 16. Both met the minimum of 2 exceedances in 3 years to support a 303(d) listing for these toxic parameters. Delist pH and put on the Planning List. Standards for pH were not met in 7 of 15 samples. A minimum of 5 exceedances in 20 samples is needed to support a 303(d) listing of this parameters.
Mule Gulch WWTP-Whitewater Draw 8 miles AZ15080301-090B	A&Wedw Impaired PBC Impaired AgL Impaired Part 5 -- Impaired	Impaired by copper, low pH, and zinc	Copper (A&Ww, AgL) -- since 1990 pH (A&Ww, PBC, AgI, AgL) -- since1990 Zinc (A&Ww) -- since 1990 TMDL sampling completed and modeling is being reviewed. Additional sampling is being conducted to support development of a site-specific standard.	Keep copper, pH, and zinc on the 303(d) List. In 20 samples, dissolved copper exceeded standards in 8 samples, dissolved zinc exceeded standards in 7 samples, and pH did not meet standards in 7 samples. The number of exceedances met minimum 303(d) listing requirements.
Ramsey Canyon Creek headwaters-San Pedro River 13 miles AZ15050202-404	A&Wc Attaining FC Attaining FBC Attaining DWS Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses			
Rucker Canyon Creek headwaters-Whitewater Draw 10 miles AZ15080301-288	A&Wc Attaining FC Attaining FBC Attaining DWS Attaining AgL Attaining Part 1 -- Attaining All Uses			
San Pedro River Mexico border-Charleston 28 miles AZ15050202-008	A&Ww Attaining FC Inconclusive FBC Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to beryllium standard exceeded in 1 sample out of 1 collected.	Turbidity (A&Ww) -- since 1990	Delist. Only 2 of 18 samples exceeded the turbidity standard. Turbidity is attaining designated uses with less than 4 exceedances in 18 turbidity samples.

7/12 pH add

OK

TABLE 23. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – SAN PEDRO-WILLCOX PLAYA-RIO YAQUI WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
San Pedro River Charleston-Walnut Gulch 9 miles AZ15050202-006	A&Ww Inconclusive FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to turbidity standard exceeded in 1 sample out of 4 collected.		
San Pedro River Babocomari Creek-Dragoon Wash 17 miles AZ15050202-003	A&Ww Attaining FC Attaining FBC Inconclusive AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to: 1. Escherichia coli not meeting standards in 1 out of 4 samples collected 2. Need for current fecal coliform and 3. Turbidity exceedances (see 303(d) delist comment in the far right column.)	Fecal coliform (A&Ww, AgL) -- since 1990 Turbidity (A&Ww) -- since 1990	Delist fecal coliform and turbidity and add to the Planning List. No current fecal coliform data and in older data only 1 sample out of 6 collected exceeded standards (need a minimum of 2 exceedances in 3 years to support a 303(d) listing). For turbidity, 3 samples out of 10 exceeded standards, and the minimum is 5 exceedances out of 20 samples to support a 303(d) listing.
San Pedro River Dragoon Wash-Tres Alamos Wash 16 miles AZ15050202-002	A&Ww Impaired FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 5 -- Impaired	Impaired by nitrate	Nitrate (A&Ww) – since 1990	Keep nitrate on the303(d) List. Nitrate standard was exceeded in 5 samples out of 20 samples, which meets minimum 303(d) listing requirements.
		Add to the planning list due to: 1. Fecal coliform and turbidity exceedances (see 303(d) delist comment in far right column) and 2. Missing core parameters.	Fecal coliform(A&Ww, AgI, AgL) – since 1990 Turbidity (A&Ww) – since 1990	Delist fecal coliform and turbidity and place them on Planning List. No current data. Older fecal coliform data exceeded standards in only 1 out of 6 samples (minimum is 2 exceedances in 3 years to support a 303(d) listing). Older turbidity data exceeded standards in 3 out of 10 samples (minimum of 5 exceedances in 20 samples needed to support 303(d) listing).
San Pedro River Hot Springs Creek-Redfield Canyon 13 miles AZ15050203-011	A&Ww Inconclusive FC Attaining FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 2 -- Attaining Some Uses	Add to the Planning List due to: 1. *E. coli* and fecal coliform each standard exceeded1 of 4 samples 2. Turbidity standard exceeded in 1 our of 5 samples.		
San Pedro River Aravaipa Creek-Gila River 15 miles AZ15050203-001	A&Ww Inconclusive FC Attaining FBC Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to *E. coli* standard exceeded in 1 of 4 samples collected and turbidity exceedances (see 303(d) delist comment in far right column).	Turbidity (A&Ww) – since 1990	Delist turbidity and add to the Planning List. No current data and older turbidity data shows only 2 samples out of 5 exceeded standards (need a minimum of 5 out of 20 samples to support a 303(d) listing for this parameter).
Winwood Canyon headwaters-Mule Gulch 1 mile AZ15080301-340	A&We Inconclusive PBC Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. Copper and pH not meeting standards in 1 sample out of 2 collected. 2. Need more sampling events and 3. Missing core parametric coverage. To be addressed as part of the Mule Gulch TMDL study.		

TABLE 23. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS – SAN PEDRO-WILLCOX PLAYA-RIO YAQUI WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Whitewater Draw Elfrida Highway-Mule Gulch AZ15080301-004 A&Ww, FC, FBC, AgI, AgL	Part 3 – Not assessed (All uses are inconclusive by default: A&Ww, FBC, FC, AgI, AgL.)	Add to the Planning List due to: 1. Lead exceeded standard slightly in 1 sample out of 1 collected; 2. Need more sampling data and core parameters to assess designated uses.		
Whitewater Draw Mule Gulch-Mexico border 6 miles AZ15080301-002	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to: 1. Beryllium, dissolved oxygen, lead, manganese, turbidity, and zinc exceedances (see 303(d) delist comments in far right column) and 2. Missing core parameters.	Arsenic (FC) – since 1990 Beryllium (FC) – since 1990 Copper (A&Ww, AgL) – since 1988 Dissolved oxygen (A&Ww) – since 1990 Lead (AgL) – since 1994 Manganese (FBC) – since 1990 Turbidity (A&Ww) – since 1990 Zinc (AgI) – since 1990	Delist all pollutants. No exceedances in the current six monitoring events, and insufficient older data to support a 303(d) listing. Add beryllium, dissolved oxygen, lead, manganese, turbidity, and zinc to Planning List (do not add arsenic and copper) for the following reasons: 1. No exceedances in the current data (4 samples), but critical conditions may not have been represented by current monitoring of this ephemeral stream reach; 2. Beryllium, lead, manganese, and zinc exceeded standards at 2 sites during 1 sampling event in 1992, while under current listing criteria there needs to be at least 5 exceedances of these standards in 20 samples. 3. No current turbidity and dissolved oxygen monitoring data. Arsenic and copper should be delisted due to listing errors. Arsenic is and has been meeting the arsenic standard adopted in 1996. Copper did not exceed standards at this site.
SAN PEDRO-WILLCOX PLAYA-RIO YAQUI WATERSHED -- LAKE ASSESSMENTS				
Riggs Flat Lake 9 acres AZL15050201-1210	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive Oligotrophic	Add to the Planning List due to turbidity standard exceeded in 1 sample out of 1 collected and missing core parameters.		
Snow Flat Lake 1 acre AZL15050201-1420	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive Oligotrophic	Add to the Planning List due to missing core parameters.		

*See Volume II Table 22, starting on page SP - 7, for more monitoring data and further details concerning the basis of each assessment.

TABLE 24. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – SANTA CRUZ-RIO MAGDALENA-RIO SONOYTA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
SANTA CRUZ-RIO MAGDALENA-RIO SONOYTA WATERSHED -- STREAM ASSESSMENTS				
Alum Gulch headwaters-ephemeral reach 2 miles AZ15050301-581A	A&Ww Impaired FC Inconclusive FBC Inconclusive AgL Inconclusive Part 5 -- Impaired	Impaired by: cadmium, copper, and zinc	Cadmium (A&Ww, FC, FBC, AgL) -- since 1996 Copper (A&Ww) -- since 1996 Zinc (A&Ww, FC, FBC, AgL) -- since 1996 pH (low) (A&Ww, FBC, AgL) -- since 1996 The TMDL report is being revised to address comments and recommendations received during a public comment period in February 2002 and to incorporate new information from the US Geological Survey. Modeling updates are being considered. ADEQ intends to complete the TMDL in 2002.	Keep cadmium, copper, and zinc on the 303(d) List. In 10 samples, dissolved cadmium exceeded standards in 6 samples, dissolved copper exceeded standards in 9 samples, and zinc exceeded standards in 10 samples. (Minimum is 2 exceedances in 3 years to support a 303(d) listing of these toxic parameters.)
		Add to Planning List due to: 1. pH not meeting standards (see 303(d) delist comments in far right column) and 2. Missing core parameters.		Delist pH and place it on the Planning List. pH exceeded standards in 7 samples out of 7 collected. Need a minimum of 20 samples with 5 exceedances to place this parameter on the 303(d) List.
Cienega Creek headwaters-Interstate 10 37 miles AZ15050302-006A (Unique Waters)	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. Insufficient sampling events, 2. Missing bacteria samples, and 3. Lack of seasonal representation.		
Cienega Creek Interstate 10-Del Iago Dam 11 miles AZ15050302-006B	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. Insufficient sampling events, 2. Missing bacteria samples, and 3. Lack of seasonal representation.		
Endless Mine tributary headwaters-Harshaw Creek 1.5 miles AZ15050301-888	A&We Inconclusive PBC Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to low pH in 3 samples out of 3 collected and missing core parameters. (To be addressed as part of the Harshaw TMDL investigation.)		
Harshaw Creek headwaters-ephemeral segment 10 miles AZ15050301-025A	A&Ww Impaired FC Inconclusive FBC Inconclusive AgL Inconclusive Part 5 -- Impaired	Impaired by: zinc	Zinc (A&Ww) – since 1988 pH (A&Ww, FBC, AgL) – since 1988 Copper (A&Ww, AgL) – since 1988 The TMDL report is being revised to address comments and recommendations from a public comment period in February 2002 and to incorporate new information from the US Geological Survey. Modeling updates are being considered. ADEQ expects to submit the TMDL to EPA for review in 2002.	Keep zinc on the 303(d) List. Dissolved zinc exceeded standards in 4 samples out of 9 collected. (Minimum to support a 303(d) listing is 2 exceedances in 3 years.)
		Add to the Planning List due to 1. Copper and pH not meeting standards (see 303(d) delist comments in far right column) and 2. Missing core parameters.		Delist pH and copper and put them on the Planning List. Dissolved copper and pH did not meet standards in 1 sample out of 9 collected. (Need a minimum of 2 exceedances in 3 years for dissolved copper, and 5 exceedances in 20 samples for pH.)

TABLE 24. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – SANTA CRUZ-RIO MAGDALENA-RIO SONOYTA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Humbolt Canyon headwaters-Alum Gulch 3 miles AZ15050301-340	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 – Inconclusive	Add to the Planning List due to: 1. Copper, zinc, and low pH exceedances 2. Missing core parameters. 3. Need a minimum of 3 sampling events (only 1).	(Problem will be addressed as part of the Alum Gulch TMDL investigation.)	
Nogales & East Nogales Washes Mexico border-Potrero Wash 6 miles AZ15050301-011	A&Ww Impaired PBC Impaired Part 5 -- Impaired	Impaired by chlorine, turbidity, and fecal coliform	Chlorine(A&Ww) – since 1996 *Escherichia coli* (FBC) – since 1988 Fecal coliform (A&Ww, PBC) – since 1988 Turbidity (A&Ww) – since 1994 Problem due to insufficient wastewater infrastructure in Mexico. Chlorine tablets put in the stream to mitigate high bacterial contamination is toxic to aquatic life.	Keep fecal coliform, chlorine and turbidity on the 303(d) List. Fecal coliform exceeded in 3 samples out of 16 collected and chlorine exceeded standards in 26 out of 26 samples (meeting the minimum 303(d) listing requirement of 2 exceedances in 3 years). Turbidity exceeded standards in 5 out of 23 samples. Delist Escherichia coli. This was a listing error. This standard does not currently apply to this stream.
Pena Blanca Canyon Creek Mexico border-Pena Blanca Lake 5 miles AZ15050301-808	A&Ww Inconclusive FBC Inconclusive FC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 – Inconclusive	Add to the Planning List due to missing core parameters and insufficient sampling event.		
Potrero Creek Interstate 19-Santa Cruz River 5 miles AZ15050301-500B	A&Ww Impaired FC Attaining FBC Attaining AgL Impaired Part 5 -- Impaired	Impaired by fecal coliform Add to the Planning List due to: 1. Chlorine standard exceeded but only one sampling event and 2. Missing core parameters.	Part of the Nogales Wash and East Nogales Wash problem with wastewater infrastructure. See comment in Nogales and East Nogales Washes.	Add fecal coliform to the 303(d)List. Fecal coliform exceeded standards in 3 out of 17 samples collected. (Minimum of 3 exceedances in 2 years to support 303(d) listing of this parameter.)
Sabino Canyon Creek headwaters-Tanque Verde 20 miles AZ15050302-014	A&Wc Inconclusive FC Inconclusive FBC inconclusive DWS Inconclusive AgL Inconclusive Part 3 – Inconclusive	Add to the Planning List due to: 1. Dissolved oxygen not meeting standards in 1 sample out of 1 sample collected. 2. Need more sampling events and 3. Missing core parameters.		

TABLE 24. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – SANTA CRUZ-RIO MAGDALENA-RIO SONOYTA WATERSHED

2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Santa Cruz River Mexico border-Nogales WWTP 17 miles AZ15050301-010	A&Ww Impaired FC Attaining FBC Impaired DWS Impaired AgI Impaired AgL Impaired Part 5 -- Impaired	Impaired by *Escherichia coli* and fecal coliform	Turbidity (A&Ww) – since 1990	Add Escherichia coli and fecal coliform to the 303(d) List. Both bacteria exceeded standards in 2 samples out of 7 collected, and both exceedances occurred within two years.
		Add to Planning List due to: 1. Turbidity standard exceeded (see 303(d) delist comment in the far right column), and 2. Beryllium standard exceeded in 1 sample out of 1 collected.		Delist turbidity and add to the Planning List. Turbidity exceeded standards in 2 samples out of 9 collected. Need a minimum of 5 exceedances and 20 samples to keep on the 303(d) List.
Santa Cruz River Nogales WWTP-Josephine Canyon 9 miles AZ15050301-009	A&Wedw Impaired PBC Impaired AgL Impaired Part 5 -- Impaired	Impaired by fecal coliform	Cyanide (A&Wedw) – since 1992	Add fecal coliform to the 303(d) list. Fecal coliform standards were exceeded in 7 samples out of 37 in 5 years (minimum for 303(d) listing is 2 exceedances in 3 years).
		Add to the Planning List due to: 1. Fish anomalies documented by the US Fish and Wildlife Service in 1997 may indicate narrative standards violations, and 2. Missing core parameters.	Turbidity (A&Wedw) – since 1992	Delist cyanide and turbidity from the 303(d) List. No current samples. Latest cyanide data (collected in 1993 after the 1992 listing by ADEQ) showed that cyanide did not exceed standards in 10 samples. In current turbidity data, only 1 sample in 30 collected exceeded the standard (attaining use).
Santa Cruz River Josephine Canyon-Tubac Bridge 5 miles AZ15050301-008A	A&Wedw Impaired PBC Impaired AgL Impaired Part 5 -- Impaired	Impaired by fecal coliform and turbidity		Add fecal coliform and turbidity to the 303(d) List. Fecal coliform exceeded standards in 9 samples out of 37 collected. Turbidity exceeded standards in 6 out of 31 samples.
		Add to the Planning List due to: 1. Fish anomalies documented by the US Fish and Wildlife Service in 1997 may indicate narrative standards violations, and 2. Missing core parameters.		
Santa Cruz River Tubac Bridge-Sopori Wash 9 miles AZ15050301-008B	A&Wedw Impaired PBC Impaired AgL Impaired Part 5 -- Impaired	Impaired by fecal coliform		Add fecal coliform to the 303(d) List. Fecal coliform exceeded standards in 6 out of 37 samples collected. (Only needs to exceed in 2 samples in 3 years.)
		Add to the Planning List due to missing core parameters.		
Santa Cruz River Canada del Oro-Guild Wash 9 miles AZ15050301-001	A&Wedw Inconclusive PBC Inconclusive Part 3 – Inconclusive	Add to the Planning List due to: 1. Dissolved oxygen not meeting standards in 6 out of 12 samples (minimum of 5 exceedances in 20 samples is needed for a 303(d) listing of this parameter), and 2. Missing core parameters.		
Sonoita Creek headwaters-1 km below Hwy-82 13 miles AZ15050301-013A	A&We Inconclusive PBC Inconclusive AgL Inconclusive Part 3 – Inconclusive	Add to the Planning List due to missing core parameters.		

TABLE 24. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – SANTA CRUZ-RIO MAGDALENA-RIO SONOYTA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Sonoita Creek 750 ft below WWTP-Santa Cruz R. 19 miles AZ15050301-013C	A&Ww Inconclusive FC Attaining FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameters.	Dissolved oxygen – since 1990 TMDL investigation completed and report written to support delisting dissolved oxygen.	Delist dissolved oxygen. Investigation revealed that low dissolved oxygen was naturally occurring due to ground water upwelling at spring sources in this reach.
Unnamed trib to Three R Canyon headwaters-Three R Canyon 1 mile AZ15050301-xxx	A&Ww Inconclusive FC Inconclusive FBC Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to pH, copper, and zinc exceeded standards in 1 sample out of 1 collected.	(Problem will be addressed as part of the Three R Canyon TMDL.)	
Three R Canyon headwaters-ephemeral segment 5 miles AZ15050301-558A	A&Ww Impaired FC Inconclusive FBC Inconclusive Part 5 -- Impaired	Impaired by cadmium, copper, and zinc.	Zinc (A&Ww) – since 1994 Copper (A&Ww) – since 1994 pH (A&Ww, FBC) – since 1994 Beryllium (FC) – since 1994 The TMDL report is being redrafted to address comments and recommendations submitted during a public comment period in February 2002 and to incorporate new information from the US Geological Survey. Modeling updates are being considered. ADEQ expects to complete a second public comment period and submit the TMDL to EPA in 2002.	Cadmium, copper, and zinc should be on the 303(d) List. Out of 10 samples collected, dissolved cadmium standard was exceeded in 6 samples, dissolved copper standard was exceeded in 10 samples, and dissolved zinc standard was exceeded in 9 samples in 3 years. (Minimum is 2 exceedances in 3 years for these toxic parameters.)
		Add to the planning list due to: 1. Beryllium and pH not meeting standards (see 303(d) delist comments in far right column) and 2. Missing core parameters.		Delist pH and beryllium and add to the Planning List. The pH exceeded standards in 8 samples of 9 collected and beryllium exceeded in 2 samples out of 2 collected. (Minimum is 5 exceedances in 20 samples to support a 303(d) listing for these standards.)
SANTA CRUZ-RIO MAGDALENA-RIO SONOYTA WATERSHED -- LAKE ASSESSMENTS				
Arivaca Lake 118 acres AZL15050304-0080	A&Ww Inconclusive FC Not attaining FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 4A -- Not Attaining Hypereutrophic	Add to the Planning List to: 1. Evaluate effectiveness of mercury TMDL strategies being implemented, 2. Missing core parameters, 3. Dissolved oxygen not meeting standards in 1 samples out of 7 4. pH not meeting standards in 3 samples out of 7, and 5. Fish kill in 1999 related to algal blooms, which may be evidence of a narrative standard violation.	Narrative toxic standard (mercury in fish tissue) (FC) – since 1992 Mercury TMDL completed and approved by EPA in 1999.	Delist mercury and add to the Planning List because of approved TMDL. Currently implementing TMDL strategies. DO=1/7 pH=3/7 2x in 1998 Fish Kill
Kennedy Lake 10 acres AZL15050302-0720	A&Ww Attaining FC Attaining PBC Inconclusive Part 2 -- Attaining Some Uses Eutrophic	Add to the Planning List due to missing core parameters.		

TABLE 24. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – SANTA CRUZ-RIO MAGDALENA-RIO SONOYTA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Lakeside Lake 15 acres AZL15050302-0760	A&Ww Inconclusive FC Attaining PBC Inconclusive Part 2 -- Attaining Some Uses Hypereutrophic	Add to the Planning List due to: 1. Dissolved oxygen not meeting standards in 4 of 16 samples, 2. Determine if DO and pH violations are related to critical conditions, 3. Fish kills in 1997 and earlier in the 1990s indicate a persistent problem related to low dissolved oxygen, which may indicate narrative nutrient standard violations, and 4. Missing core parameters	TMDL is being developed to investigate potential impacts of a proposed aeration system to mitigate nutrient loadings from reclaimed water being discharged to this water. A draft model report on DO and pH is being reviewed. ADEQ plans to complete the TMDL in 2002. (Note that Tucson installed the aeration system in June 2002.) Phase I	
Parker Canyon Lake 129 acres AZL15050301-1040	A&Wc Attaining FC Attaining FBC Inconclusive AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses Oligotrophic	Add to the Planning List due to missing core parameters.		
Patagonia Lake 230 acres AZL15050301-1050	A&Wc Inconclusive FC Attaining FBC Inconclusive DWS Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses Eutrophic	Add to the planning List due to: 1. Dissolved oxygen not meeting standards in 1 of 4 samples and 2. Missing core parameters.		
Pena Blanca Lake 51 acres AZL15050301-1070	A&Wc Inconclusive FC Not attaining FBC Inconclusive AgI Attaining AgL Inconclusive Part 4A -- Not Attaining Mesotrophic	Add to the Planning List to: 1. evaluate the effectiveness of implemented mercury TMDL strategies (mercury contamination is noted in fish tissue), 2. pH not meeting standards in 2 of 3 samples collected, and 3. Missing core parameters.	Narrative toxic standard (mercury in fish tissue) (FC) – since 1996. Mercury TMDL approved by EPA in 1999.	Delist mercury and move to Planning List to determine effectiveness of the approved TMDL.
Rose Canyon Lake 7 acres AZL15050302-1260	A&Ww Inconclusive FBC Inconclusive FC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 – Inconclusive Trophic status not calculated	Add to the Planning List due 1. pH and turbidity not meeting standards in 1 out of 1 collected, 2. Missing core parameters, and 3. Insufficient sampling events.		

*See Volume II Table 25, starting on page SC - 7, for more monitoring data and further details concerning the basis of each assessment.

TABLE 25. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – UPPER GILA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
UPPER GILA WATERSHED -- STREAM ASSESSMENTS				
Ash Creek headwaters-Gila River 19 miles AZ15040005-040	A&Wc Inconclusive FC Attaining FBC Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to low dissolved oxygen in 1 of 3 samples.		
Blue River New Mexico border-KP Creek 21 miles AZ15040004-026	A&Wc Attaining FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses			
Blue River KP Creek-San Francisco River 29 miles AZ15040004-025	A&Wc Attaining FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses		Turbidity (A&Wc) – since 1994	Delist turbidity. Turbidity exceeded standards in only 2 of 16 samples (attaining uses)
Bonita Creek Park Creek-Gila River 15 miles AZ15040005-030 (Unique Waters)	A&Ww Attaining FC Attaining FBC Attaining DWS Attaining AgL Attaining Part 1 -- Attaining All Uses			
Campbell Blue Creek headwaters-Blue River 20 miles AZ15040004-028	A&Wc Attaining FC Attaining FBC Attaining AgL Attaining Part 1 -- Attaining All Uses			
Cave Creek headwaters-USFS boundary 9 miles AZ15040006-852A (Unique Waters)	A&Wc Attaining FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses			
Cave Creek USFS boundary-New Mexico 9 miles AZ15040006-852B	A&Wc Attaining FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses			

TABLE 25. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – UPPER GILA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	Designated Use Assessments* 5-Part Listing Lake Trophic Status	Conclusions Pollutants of Concern	STATUS OF THE 1998 303(d) LIST	RECOMMENDATIONS FOR 2002 303(d) LIST
Eagle Creek headwaters-Willow Creek 16 miles AZ15040005-028	A&Wc Attaining FC Attaining FBC Attaining DWS Attaining Agl Attaining AgL Attaining Part 1 -- Attaining All Uses			
Eagle Creek Willow Creek-Sheep Wash 6 miles AZ15040005-027	A&Wc Inconclusive FC Attaining FBC Attaining DWS Attaining Agl Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to turbidity standard exceeded in 1 of 4 samples.		
Eagle Creek Sheep Wash-Gila River 25 miles AZ15040005-025	A&Wc Inconclusive FC Attaining FBC Attaining DWS Attaining Agl Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to turbidity exceedances (see 303(d) delist comment in far right column).	Turbidity (A&Wc) – since 1998	Delist turbidity and put on the Planning List. Turbidity standard exceeded in 3 samples out of 10 collected. Minimum for 303(d) listing is 5 exceedances in 20 samples for this parameter. 3/10
Frye Creek headwaters-Highline Canal 16 miles AZ15040005-988	A&Wc Attaining FC Attaining FBC Attaining Agl Attaining AgL Attaining Part 1 -- Attaining All Uses			
Gila River New Mexico border-Bitter Creek 16 miles AZ15040002-004	A&Ww Inconclusive FC Inconclusive FBC Inconclusive Agl Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to turbidity (see 303(d) delist comment in the far right column).	Turbidity (A&Ww) – since 1992	Delist turbidity and add it to the Planning List. Listing based on USGS sampling sites in New Mexico. Need Arizona monitoring data.
Gila River Skully Creek-San Francisco River 15 miles AZ15040002-001	A&Ww Inconclusive FC Attaining FBC Attaining Agl Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to turbidity (see 303(d) delist comment in the far right column).	Turbidity (A&Ww) – since 1998	Delist turbidity and add it to the Planning List. Turbidity standard exceeded in 6 of 10 samples. A minimum of 5 exceedances in 20 samples is needed to support 303(d) listing of this parameter.
Gila River San Francisco River-Eagle Creek 3 miles AZ15040005-024	A&Ww Inconclusive FC Attaining FBC Attaining Agl Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to turbidity (see 303(d) delist comment in the far right column).	Turbidity (A&Ww) – since 1998	Delist turbidity and add it to the Planning List. Turbidity standard exceeded in 12 of 12 samples. Minimum of 5 exceedances in 20 samples is needed to support 303(d) listing of this parameter.

TURB yes!

6/10 TURB add

12/12 TURB

TABLE 25. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – UPPER GILA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
Gila River Eagle Creek-Bonita Creek 10 miles AZ15040005-023	A&Ww Inconclusive FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to turbidity (see 303(d) delist comment in the far right column).	Turbidity (A&Ww) — since 1990	Delist turbidity and add to the Planning List. Turbidity standard exceeded in 9 of 12 samples. Minimum of 5 exceedances in 20 samples is needed to support a 303(d) listing of this parameter.
Gila River Bonita Creek-Yuma Wash 6 miles AZ15040005-022	A&Ww Impaired FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 5 -- Impaired	Impaired by turbidity	Turbidity (A&Ww) — since 1990	Keep turbidity on the 303(d) List. Turbidity exceeded standards in 13 samples out of 33.
K P Creek headwaters-Blue River 12 miles AZ15040004-029 (Unique Waters)	A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgL Inconclusive Part 3-- Inconclusive	Add to the Planning List due to missing core parameters.		
San Francisco River headwaters-New Mexico 13 miles AZ15040004-023	A&Wc Inconclusive FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to: 1. Turbidity (see 303(d) delist comment in the far right column) 2. Dissolved oxygen standard exceeded in 1 of 8 samples.	Turbidity (A&Ww) — since 1998 Escherichia coli (FBC) — since 1998	Delist turbidity and add to the Planning List. Turbidity standard exceeded in 7 of 8 samples, but a minimum of 20 samples is required to support a 303(d) listing for this parameter. Delist *Escherichia coli*. Not standard exceeded in 10 samples.
San Francisco River New Mexico-Blue River 21 miles AZ15040004-004	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to turbidity standard exceeded in 1 sample out of 4 collected.		
San Francisco River Blue River-Limestone Gulch 19 miles AZ15040004-003	A&Ww Inconclusive FC Attaining FBC Inconclusive AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to: 1. Turbidity (see 303(d) delist comment in the far right column). 2. Beryllium standard exceeded in 1 of 1 sample.	Turbidity (A&Ww) — since 1998	Delist turbidity and move to Planning List. Turbidity standard exceeded in 4 of 11 samples, but a minimum of 5 exceedances in 20 samples is needed to support a 303(d) listing of this parameter.
San Francisco River Limestone Gulch-Gila River 13 miles AZ15040004-001	A&Ww Impaired FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 5 -- Impaired	Impaired by turbidity	Turbidity (A&Ww) — since 1992	Keep turbidity on the 303(d) List. Turbidity standard exceeded in 9 samples out of 33 collected.

9/12 TURB Add

7/8 TURB add

4/11 TURB add

TABLE 25. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – UPPER GILA WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
Waterbody Name Segment Description Size Waterbody ID	**Designated Use Assessments* 5-Part Listing Lake Trophic Status**	**Conclusions Pollutants of Concern**	**STATUS OF THE 1998 303(d) LIST**	**RECOMMENDATIONS FOR 2002 303(d) LIST**
South Fork Cave Creek headwaters-Cave Creek 8 miles AZ15040006-849 (Unique Waters)	A&Wc Attaining FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses			
UPPER GILA WATERSHED -- LAKE ASSESSMENTS				
Dankworth Ponds 8 acres AZ15040005-0440	A&Ww Attaining FC Attaining FBC Inconclusive Part 2 -- Attaining Some Uses Mesotrophic	Add to the Planning List due to missing core parameters.	Dissolved oxygen (A&Wc) — since 1998 TMDL investigation completed in 2002 and a report recommending delisting dissolved oxygen is being prepared.	Delist dissolved oxygen. Investigation and numerous samples at the lake revealed that naturally low dissolved oxygen occurs in this lake due to spring source of water as ground water is naturally much lower than surface water standards for dissolved oxygen.
Luna Lake 120 acres AZ15040004-0840	A&Ww Not attaining FC Attaining FBC Not attaining AgL Not attaining Part 4A – Not Attaining Eutrophic	Add to the Planning List due to: 1. Need for TMDL strategy implementation effectiveness monitoring for pH, DO, and narrative nutrients, 2. Missing bacteria samples, and 3. Fish kills in 1999 and 2002 related to algal blooms which may be evidence of a narrative standard violation.	pH (high) (A&Wc, FBC, AgL) — since 1998 Dissolved oxygen (A&Wc) — since 1998 Narrative nutrients (A&Wc) — since 1998 TMDL approved by EPA in 2000.	Delist pH, dissolved oxygen, and narrative nutrients and move to Planning List because a TMDL has been completed and approved by EPA in 2000. Currently, in the TMDL strategy implementation phase to bring the lake into compliance with standards.
Roper Lake 25 acres AZ15040005-1250	A&Ww Attaining FC Attaining FBC Inconclusive Part 2 -- Attaining Some Uses Mesotrophic	Add to the Planning List due to missing core parameters.	Arsenic (FBC) — since 1998 Dissolved oxygen (A&Ww) — since 1998 pH (A&Ww, FBC) — since 1998 TMDL investigation completed in 2002 and a report recommending delisting these parameters is being written.	Delist arsenic, dissolved oxygen and pH. Investigations and numerous samples at the lake indicate that: 1. The low dissolved oxygen level is not due to anthropogenic activities but is due to spring sources of water. Such ground water is naturally much lower than surface water standards. and 2. In seven current samples, neither arsenic nor pH exceeded standards; therefore, attaining uses based on these standards.

*See Volume II Table 28, starting on page UG - 7, for more monitoring data and further details concerning the basis of each assessment.

TABLE 26. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – VERDE WATERSHED

2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
			STATUS OF THE 1998 303(d) LIST	RECOMMENDATIONS FOR 2002 303(d) LIST
Waterbody Name Segment Description Size Waterbody ID	**Assessment 5-Part Listing Lake Trophic Status**	**Pollutants of Concern (Number of Samples Standard exceeded)**	**Pollutants (Designated Use Impaired)**	
VERDE WATERSHED -- STREAM ASSESSMENTS				
Apache Creek headwaters-Walnut Creek 8 miles AZ15060201-019	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events		
Beaver Creek Dry Beaver Creek-Verde River 9 miles AZ15060202-002	A&Wc Impaired FC Attaining FBC Inconclusive AgL Attaining Part 5 -- Impaired	Impaired by: turbidity	Turbidity (A&Wc) — since 1996 Dissolved oxygen (A&Wc) — since 1996 Ongoing TMDL investigation indicates that low dissolved oxygen is natural and should be delisted. Further investigation of potential turbidity sources.	Keep turbidity on the 303(d) List. Turbidity exceeded standards in 13 samples out of 33 collected.
		Add to the Planning List due to missing core parameters.		Delist dissolved oxygen. Investigation showed that low dissolved oxygen is naturally occurring due to spring sources of flow and the ground water upwelling is naturally very low is dissolved oxygen.
Bitter Creek Jerome WWTP-2.5 miles below 2 miles AZ15060202-066B	A&Wedw Inconclusive PBC Inconclusive Part 3 -- Not assessed	Add to the Planning List due to insufficient sampling events and lack of current monitoring data. (Only 1 sampling event and need a minimum of 3 events.)		
Unnamed tributary to Bitter Creek headwaters-Bitter Creek 7 miles AZ15060202-868	Part 3 -- Not assessed (All uses are inconclusive by default: A&Ww, FBC, FC, AgI, AgL)	Add to the Planning List due to: 1. Cadmium, copper, pH, and zinc exceedances (see delist recommendation from 303(d) List), and 2. Lack of current monitoring data.	Cadmium (A&Ww, FBC) — 1988 Copper (A&Ww, AgL) — 1988 pH (A&Ww, FBC, AgL) — 1988 Zinc (A&Ww, AgL) — 1988 TMDL investigation initiated in 1999, but have had trouble gaining access to stream on private property.	Delist cadmium, copper, zinc, and pH and add to Planning List. Sufficient monitoring plan not available and some questions concerning whether samples represent in-stream water quality conditions puts older data credibility in question. Need new data.
East Verde River headwaters-American Gulch 36 miles AZ15060203-022A	A&Wc Inconclusive FC Attaining FBC Attaining DWS Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to turbidity not exceeding standards in 7 out of 14 samples. (Minimum of 5 exceedances in 20 samples needed to support a 303(d) listing of this parameter.)		
East Verde River American Gulch-Verde River 38 miles AZ15060203-022B	A&Wc Attaining FC Attaining FBC Attaining DWS Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses			

TABLE 26. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – VERDE WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
			STATUS OF THE 1998 303(d) LIST	RECOMMENDATIONS FOR 2002 303(d) LIST
Waterbody Name Segment Description Size Waterbody ID	**Assessment 5-Part Listing Lake Trophic Status**	**Pollutants of Concern (Number of Samples Standard exceeded)**	**Pollutants (Designated Use Impaired)**	
Ellison Creek headwaters-East Verde River 11 miles AZ15060203-459	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events and missing core parameters.		
Fossil Creek headwaters-Verde River 20 miles AZ15060203-024	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events.		
Granite Creek headwaters-15060202-060 29 miles AZ15060202-059	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. *Escherichia coli* standard exceeded in 2 in 5 years (minimum of 2 in 3 years to support 303(d) listing), 2. Beryllium standard exceeded in 1 sample of 6 collected, 3. Turbidity standard exceeded in 1 sample out of 2 collected, and 4. Missing core parameters.		
Munds Creek headwaters-Oak Creek 17 miles AZ15060202-415	A&Ww Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to missing core parameters and insufficient seasonal representation.	Fecal coliform (A&Ww, DWS, AgI, AgL) — since 1994 Nutrients (A&Ww) — since 1994 Nutrient TMDL approved by EPA in 1999.	Delist fecal coliform and nutrients. No fecal coliform exceedances among 15 samples. Wastewater disposal practices were modified in the watershed so that golf course along Munds Creek is not being overly supplied with effluent. TMDL completed in 1999 indicates that nutrient loadings are no longer a problem.
Oak Creek headwaters-West Fork Oak Creek 4 miles AZ15060202-019 (Unique Waters)	A&Ww Inconclusive FC Attaining FBC Attaining DWS Inconclusive AgI Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to turbidity standard exceeded in 1 sample out of 9 collected and missing core parameters.	Phosphorus (A&Wc) — since 1998 Nutrient TMDL approved by EPA in 1999 was completed at request of community to update an old TMDL and indicated no nutrient loading problems.	Delist phosphorus. Listing was based on a calculation error when converting phosphate to total phosphorus. TMDL indicated no nutrient loading problems.
Oak Creek West Fork of Oak Creek-Dry Creek (except for Slide Rock) 24 miles AZ15060202-018B (Unique Waters)	A&Wc Impaired FC Attaining FBC Attaining DWS Attaining AgI Attaining AgL Attaining Part 5 -- Impaired	Impaired by: turbidity	Nutrient TMDL approved by EPA in 1999 was completed at request of community to update an old TMDL and indicated no nutrient loading problems.	Add turbidity to the 303(d) List. Turbidity exceeded standards in 9 samples out of 42 samples collected. (Note that a change in designated use in Arizona's new surface water quality rules based on elevation will bring this reach into compliance. Rules being reviewed by EPA.)

TABLE 26. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – VERDE WATERSHED

2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
			STATUS OF THE 1998 303(d) LIST	RECOMMENDATIONS FOR 2002 303(d) LIST
Waterbody Name **Segment Description** **Size** **Waterbody ID**	**Assessment** **5-Part Listing** **Lake Trophic Status**	**Pollutants of Concern** **(Number of Samples Standard exceeded)**	**Pollutants** **(Designated Use Impaired)**	
Oak Creek Slide Rock State Park 1 mile AZ15060202-018A (Unique Waters)	A&Wc Inconclusive FC Inconclusive FBC Not attaining DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 4A -- Not Attaining	Add to the Planning List to determine the effectiveness of the TMDL implementation strategies to control bacteria levels in the Slide Rock area of Oak Creek.	*Escherichia coli* (FBC) — since 1994 Fecal coliform (A&Ww, AgI, AgL, DWS) — since 1994 Bacteria TMDL approved by EPA in 1999. (See nutrient TMDL discussion in AZ15060202-018B)	Delist. *Escherichia coli* and fecal coliform and add to the Planning List to determine effectiveness of TMDL implementation strategies.
Oak Creek Dry Creek-Spring Creek 10 miles AZ15060202-017 (Unique Waters)	A&Wc Inconclusive FC Attaining FBC Inconclusive DWS Attaining AgI Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to turbidity exceeding standards (see 303(d) delist comment in the far right column).	Turbidity (A&Wc) — since 1990 Nutrient TMDL approved by EPA in 1999 was completed at request of community to update an old TMDL and indicated no nutrient loading problems.	Delist turbidity and add it to the Planning List. Turbidity standard exceeded in 3 samples out of 4 collected. (Minimum of 5 exceedances in 20 samples is needed to support a 303(d) listing of this parameter.) proposed change in Rules Turbidity 25 to 10 NTU with up to 50 NTU 2 in 20 exceedances
Oak Creek Spring Creek-Verde River 13 miles AZ15060202-016 (Unique Waters)	A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. Turbidity standard exceeded in 1 of 2 samples (see 303(d) delist comment in the far right column), 2. Lacking sampling events, and 3. Missing core parameters.	Turbidity (A&Wc) — since 1990 Nutrient TMDL approved by EPA in 1999 was completed at request of community to update an old TMDL and indicated no nutrient loading problems.	Delist turbidity and add to Planning List. No current data and older turbidity data exceeded standards only in 2 out of 4 samples. (Minimum of 5 exceedances in 20 samples is needed to support a 303(d) listing of his standard.)
Pine Creek headwaters-East Verde River 10 miles AZ15060203-049	A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events to assess (need a minimum of 3 events).		
Pumphouse Wash headwaters-Oak Creek 8 miles AZ15060202-442	A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Attaining AgI Attaining AgL Inconclusive Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameters (fluoride and boron).		
Roundtree Creek headwaters-Tangle Creek 11 miles AZ15060203-853	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events to assess (need a minimum of 3 events).		

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TABLE 26. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – VERDE WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
			STATUS OF THE 1998 303(d) LIST	RECOMMENDATIONS FOR 2002 303(d) LIST
Waterbody Name Segment Description Size Waterbody ID	**Assessment 5-Part Listing Lake Trophic Status**	**Pollutants of Concern (Number of Samples Standard exceeded)**	**Pollutants (Designated Use Impaired)**	
Spring Creek Coffee Creek-Oak Creek 7 miles AZ15060202-022	A&Ww Attaining FC Attaining FBC Inconclusive AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameter (bacteria).		
Sycamore Creek Tule Canyon-Cedar Creek 6 miles AZ15060202-026	A&Wc Inconclusive FC Attaining FBC Inconclusive AgI Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameter (bacteria).		
Sycamore Creek headwaters-Verde River 13 miles AZ15060203-055	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events to assess (need a minimum of 3 events).		
Verde River Granite Creek-Hell Canyon 16 miles AZ15060202-052	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events to assess (need a minimum of 3 events).		
Verde River Hell Canyon-15060202-065 6 miles AZ15060202-038	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events to assess (need a minimum of 3 events).		
Verde River 15060202-065-Railroad Draw 11 miles AZ15060202-037	A&Ww Inconclusive FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to turbidity exceedances (see 303(d) delist comment in the far right column). When the TMDL is approved by EPA, TMDL will begin the implementation and monitoring phase.	Turbidity (A&Ww) — since 1990 Turbidity TMDL approved by EPA in 2002.	Delist turbidity and add to Planning List. Turbidity exceeded standards in 4 out of 15 samples. (Minimum of 5 exceedances in 20 samples needed support 303(d) listing.) (See turbidity TMDL comment) 4/15
Verde River Sycamore Creek-Oak Creek 25 miles AZ15060202-025	A&Ww Attaining FC Attaining FBC Attaining AgI Attaining AgL Attaining Part 1 -- Attaining All Uses		Turbidity (A&Ww) — since 1990 Turbidity TMDL approved by EPA in 2002.	Delist turbidity. No exceedances in 26 samples (attaining uses).

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TABLE 26. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – VERDE WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
			STATUS OF THE 1998 303(d) LIST	RECOMMENDATIONS FOR 2002 303(d) LIST
Waterbody Name Segment Description Size Waterbody ID	**Assessment 5-Part Listing Lake Trophic Status**	**Pollutants of Concern (Number of Samples Standard exceeded)**	**Pollutants (Designated Use Impaired)**	
Verde River Oak Creek-Beaver Creek 13 miles AZ15060202-015	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events to assess (need a minimum of 3 events).		
Verde River 15060203-West Clear Creek 6 miles AZ15060203-027	A&Ww Attaining FC Attaining FBC Inconclusive AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameter (bacteria).	Turbidity (A&Ww) — since 1994 Turbidity TMDL approved by EPA in 2002.	Delist turbidity. No exceedances in 6 samples collected. Older turbidity data exceeded turbidity standard in only 3 samples out of 22 collected. Both old and new data show that turbidity is not impairing designated uses.
Verde River West Clear Creek-Fossil Creek 24 miles Az15060203-025	A&Ww Inconclusive FC Attaining FBC Inconclusive AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to: 1. Turbidity standard exceeded in 4 samples out of 9 collected and 2. *Escherichia coli* standard exceeded in 1 of 9 samples.		
Verde River Tangle Creek-Ister Flat 4 miles AZ15060203-018	A&Ww Inconclusive FC Attaining FBC Attaining DWS Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to: 1. Turbidity standard exceeded in 4 samples out of 21 samples, and 2. Missing core parameter (bacteria).		
Verde River Bartlett Dam-Camp Creek 7 miles AZ15060203-004	A&Ww Attaining FC Attaining FBC Inconclusive DWS Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameter (bacteria).		
Webber Creek headwaters-East Verde River 14 miles AZ15060203-058	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events to assess (need a minimum of 3 events).		
West Clear Creek headwaters-Verde River 65 miles AZ15060203-026	A&Wc Attaining FC Attaining FBC Inconclusive AgL Attaining Part 2 -- Attaining Some Uses	Add to the Planning List due to missing core parameter (bacteria).		

TABLE 26. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – VERDE WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
			STATUS OF THE 1998 303(d) LIST	RECOMMENDATIONS FOR 2002 303(d) LIST
Waterbody Name Segment Description Size Waterbody ID	**Assessment 5-Part Listing Lake Trophic Status**	**Pollutants of Concern (Number of Samples Standard exceeded)**	**Pollutants (Designated Use Impaired)**	
West Fork of Oak Creek headwaters-Oak Creek 16 miles AZ15060202-020	A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to insufficient sampling events to assess (need a minimum of 3 events).		
Wet Beaver Creek Long Canyon-Rarick 7 miles AZ15060202-004	A&Wc Inconclusive FC Inconclusive FBC Inconclusive Agl Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. Dissolved oxygen did not meet standards in 2 samples out of 7 collected, and 2. Missing core parameters.	Turbidity (A&Wc) — since 1996 Ongoing TMDL investigation on Wet Beaver Creek and downstream on Beaver Creek.	Delist turbidity. No exceedances of the turbidity standard in 11 samples (attaining uses).
Wet Bottom Creek headwaters-Verde River 20 miles AZ15060203-020	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive Part 3 -- Inconclusive	Add to the Planning List due to: 1. Insufficient sampling events to assess (need a minimum of 3 events), and 2. Missing core parameters.		

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TABLE 26. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – VERDE WATERSHED

2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
			STATUS OF THE 1998 303(d) LIST	RECOMMENDATIONS FOR 2002 303(d) LIST
Waterbody Name Segment Description Size Waterbody ID	**Assessment 5-Part Listing Lake Trophic Status**	**Pollutants of Concern (Number of Samples Standard exceeded)**	**Pollutants (Designated Use Impaired)**	
VERDE WATERSHED -- LAKE ASSESSMENTS				
Bartlett Lake 2375 acres AZL15060203-0110	A&Ww Attaining FC Attaining FBC Inconclusive DWS Attaining AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses Mesotrophic	Add to the Planning List due to missing core parameter (bacteria).	Dissolved oxygen (A&Ww) — since 1996 Turbidity (A&Ww) -- since 1996 TMDL investigation and monitoring conducted. A report supporting this delist recommendation has been prepared.	Delist dissolved oxygen and turbidity. Only 2 dissolved oxygen samples out of 29 did not meet dissolved oxygen standard (attaining uses). Investigation showed that turbidity exceedances were temporary and caused by with upstream releases from Horseshoe Lake. Such releases are exempt from turbidity standards (R18-11-118A).
Granite Basin Lake 7 acres AZL15060202-0580	A&Ww Inconclusive FC Attaining FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 2 -- Attaining Some Uses Eutrophic	Add to the Planning List due to: 1. Dissolved oxygen and pH exceedances (see 303(d) delist recommendations in the far right column), and 2. Missing core parameters.	Dissolved oxygen (A&Ww) — since 1998 pH (A&Ww, FBC, AgI, AgL) — since 1998 Ongoing TMDL investigations	Delist dissolved oxygen and pH and add to Planning List. Dissolved oxygen did not meet standard in 3 samples out of 7 collected and pH did not meet standards in 1 sample out of 8. (Minimum of 5 exceedances in 20 samples is needed to support a 303(d) listing of for either parameter.)
Green Valley Lake 13 acres AZL15060203-0015	A&Ww Inconclusive FC Inconclusive PBC Inconclusive Part 3 -- Inconclusive Trophic status not calculated	Add to the Planning List due to missing core parameter (bacteria) and insufficient monitoring events (need a minimum of 3).		
Horseshoe Lake 2000 acres AZL15060203-0620	A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive Part 3 -- Inconclusive Trophic status not calculated	Add to the Planning List due to: 1. Dissolved oxygen not meeting standards in 1 sample out of 1 sample collected and 2. Insufficient sampling events.		
Pecks Lake 95 acres AZL15060202-1060	A&Wc Not attaining FC Attaining FBC Inconclusive AgI Attaining AgL Attaining Part 4A -- Not attaining Eutrophic	Add to the Planning List to evaluate effectiveness of dissolved oxygen and pH TMDL implementation strategies.	Dissolved oxygen (A&Wc) — since 1998 pH (A&Wc, FBC, AgI) — since 1998 EPA approved the nutrient, pH, and dissolved oxygen TMDLs in 2000.	Delist dissolved oxygen and pH due to approved TMDL and add to the 303(d) List for monitoring TMDL implementation effectiveness.
Slehr Lake 20 acres AZL15060203-1480	A&Ww Inconclusive FC Attaining FBC Inconclusive AgL Attaining Part 2 -- Attaining Some Uses Trophic status not calculated	Add to the Planning List due to missing bacteria samples. Note that with the decommissioning of the power plant on Fossil Creek and the removal of the flumes and Fossil Creek Dam, the source of water for this lake is expected to disappear.		

TABLE 26. ASSESSMENT, PLANNING LIST, AND 303(d) STATUS TABLE – VERDE WATERSHED				
2002 ASSESSMENT AND PLANNING LIST			303(d) LIST	
			STATUS OF THE 1998 303(d) LIST	RECOMMENDATIONS FOR 2002 303(d) LIST
Waterbody Name Segment Description Size Waterbody ID	**Assessment 5-Part Listing Lake Trophic Status**	**Pollutants of Concern (Number of Samples Standard exceeded)**	**Pollutants (Designated Use Impaired)**	
Stoneman Lake 125 acres AZL15060202-1490	A&Wc Not attaining FC Attaining FBC Not attaining AgI Not attaining AgL Not attaining Part 4A -- Not Attaining Eutrophic	Add to the Planning List to determine the effectiveness of narrative nutrient, dissolved oxygen, and pH TMDL implementation strategies.	Dissolved oxygen (A&Wc) — since 1998 pH (A&Wc, FBC, AgI, AgL) — since 1998 Narrative nutrients — since 1998 EPA approved the nutrient, pH, and dissolved oxygen TMDLs in 2000. Implementation of TMDL strategies is ongoing.	Delist dissolved oxygen, pH, and narrative nutrients and add to Planning List to schedule for TMDL strategy implementation effectiveness monitoring.
Sullivan Lake 1 acres AZL15060202-3370	A&Ww Inconclusive FC Attaining FBC Inconclusive AgI Attaining AgL Attaining Part 2 -- Attaining Some Uses Trophic status not calculated	Add to the Planning List due to: 1. pH not meeting standards in 1 sample out of 3 samples collected, and 2. Missing core parameters.		
Whitehorse Lake 41 acres AZL15060202-1630	A&Ww Inconclusive FC Attaining FBC Inconclusive DWS Attaining AgI Attaining AgL Inconclusive Part 2 -- Attaining Some Uses Hypereutrophic	Add to the Planning List due to: 1. Dissolved oxygen standard not met in 5 of 11 samples , 2. pH standard not met in 3 samples of 12 samples collected, 3. Turbidity standard exceeded in 11 samples of 11 collected (see 303 delist comment for turbidity in far right column), 4. Fish kill in 1999 related to algal bloom and low dissolved oxygen which may be evidence of a narrative standard violation, and 5. Missing core parameters (Note: need a minimum of 5 exceedances in 20 samples to add dissolved oxygen, pH or turbidity to the 303(d) List.)	Turbidity (A&Wc) — since 1998 3/12 pH	Delist turbidity and add to Planning List. Turbidity exceeded standards in 11 samples out of 11 collected, but need a minimum of 5 exceedances in 20 samples to support a 303(d) listing for this parameter. maybe drained & dredged SO 4B status (not 5?)

5/11 DO
11/11 TURB
Fish kill 1999 add

*See Volume II Table 31, starting on page VD - 7, for more monitoring data and further details concerning the basis of each assessment.

The 2002 303(d) Submission to EPA

The list of the impaired surface waters which must be submitted to EPA in October 2002 is included in this section (**Table 27**). The list identifies, by surface water segment, the pollutants or surface water characteristics not meeting surface water quality standards. The table also indicates the priority ranking for completion of each TMDL and which TMDLs will be targeted for initiation within the next two years (per A.A.C. R18-11-606). EPA must approve this list and has the authority to add or remove surface waters from the list based on the federal Clean Water Act, regulations, or policies.

How TMDLs are conducted and the success of Arizona's TMDL Program is discussed in Chapter VII. Completed TMDLs are highlighted by watershed in Volume II of this report.

Why do We List These Waters? – The 303(d) List is a list of all impaired waters that require more than existing technology and permit controls to achieve or maintain surface water quality standards. The objective is to systematically identify impaired surface waters and the pollutant(s) causing the impairment and ultimately establish a scientifically-based strategy (a TMDL) for restoring the surface water quality.

Priority Ranking and Scheduling TMDLs – The Clean Water Act and federal regulations (40 CFR 130.7) require the state to establish a priority ranking for each surface water on the 303(d) List. Arizona's ranking system reflects the relative value and benefits of each surface water to the state and considers, among other factors:

- The severity of the impairment in relation to the designated uses, especially threats to human health, aquatic life and wildlife;
- Surface waters where endangered or threatened species exist and the pollutant is likely to further jeopardize the listed species;
- Other pertinent information such as: economic or aesthetic importance, the complexity of the TMDL, degree of public interest, permitting issues, an impending change in water quality standard or designated use, and date when the surface water was first placed on the 303(d) list.

Arizona's Impaired Waters Identification rule **(Appendix B)** provides specific factors which must be considered in prioritizing and scheduling impaired surface waters for TMDL development. These factors are listed as footnotes at the end of **Table 27**. As a surface water may have a mixture of high, medium, and low priority factors, the final priority ranking considers all factors but weights some factors more heavily than others. **Table 27** indicates which factors were applied, which were weighted more heavily, and provides a brief discussion of the final priority ranking determination.

In general, the surface water was automatically listed as high priority, and ADEQ will initiate development of the associated TMDL within two years following EPA's approval of the 303(d) List, if there is a substantial threat to health and safety of humans, aquatic life, or wildlife. This determination was based on the following four factors:

- The magnitude of the exceedance. For example, the laboratory result was more than twice the standard.
- The duration or persistence of the problem. For example, more than half the samples exceeded standards.
- The standard was established to protect human health or wildlife from imminent harm. For example, the acute toxic Aquatic and Wildlife standards are established based on short-term exposures rather than long-term or life-time exposures.
- A Threatened or Endangered species (T&E species) may be further jeopardized by the water quality problem. This was determined by using the following information provided by the Arizona Game and Fish Department and the US Fish and Wildlife Service:
  - A. A T&E species has been confirmed within a mile of the surface water listed or the surface water is within "critical habitat" established for the species;
  - B. A standard to protect aquatic and wildlife has been exceeded, and
  - C. The published reasons for decline and vulnerability of the species indicate that the pollutant or source of the exceedance may further jeopardize this species.

Several low priority factors can take precedence over high priority factors because completing a TMDL at this time would either not be appropriate, be premature, or be an inefficient use of resources. These factors included:

- ADEQ has formally submitted to EPA a proposal to delist the surface water or pollutant.
- ADEQ has adopted a new surface water quality standard or designated use that is currently being reviewed by EPA for approval. When approved, the standard would no longer be violated.
- The surface water is expected to attain surface water quality standards before the next listing cycle due to:
  - Recently instituted treatment levels or best management practices in the drainage area,
  - Discharges or activities related to the impairment have ceased, or
  - Actions have been taken and the controls are in place or firmly scheduled for implementation that are likely to bring the surface water back into compliance.
- The water quality problem can be resolved only through the cooperative actions of an agency outside the state or federal jurisdiction (e.g., Mexico, another state, or Indian reservation).

It may become necessary to shift priority ranking of a surface water due to significant changes in resources to complete TMDLs or new information obtained concerning one of the priority factors. Such changes would be negotiated with EPA and would be made known to the public through the TMDL status page on ADEQ's web site: http://www.adeq.state.az.us/environ/water/assess/tmdl.html.

As noted in **Table 27**, new designated uses and new standards have been adopted by Arizona and submitted to EPA for approval in 2002. The turbidity and fecal coliform standards are being repealed and replaced by new standards. When adopted, the surface waters that had exceedances for beryllium and fluoride will be in compliance with the new standards. However, in most cases more monitoring is needed to determine whether the new suspended sediment concentration standard (replacing the turbidity standard) and the new *Escherichia coli* standard (replacing the fecal coliform standard) are being met. All waters listed as exceeding turbidity or fecal coliform standards will be monitored under ADEQ's Targeted Monitoring Program during the next watershed rotation (five years) to determine if the new standards are being met.

Public Participation in the Listing Process – Communicating with the public and promoting public input into the 303(d) listing process is an integral component of ADEQ's water quality management programs. A 30-day public review of this draft report was provided in June 2002. A copy of the report was posted on ADEQ's web site, notices were placed in six local newspapers throughout the state (Phoenix, Tucson, Flagstaff, Sierra Vista, Yuma, and St. Johns), and flyers concerning the public review were mailed to a list of interested persons. Copies of the report were available on CD, in hard copy, or as an electronic download from the Internet.

The response to comments and the draft 303(d) List was published in the Arizona Administrative Register on August 9, 2002, according to Arizona Revised Statue 49-232. Publication of the list in the Arizona Administrative Register is an appealable agency action and may be appealed by any party that submitted written comments on the draft list. If a notice of appeal of a listing occurs within the 45-day publication period in the Arizona Administrative Register, ADEQ cannot include the challenged listing in its initial submission to EPA until the listing is upheld in ADEQ's Director or if the challenge is withdrawn.

EPA Action on the Methods and List Approval – EPA provided comments on the Impaired Waters Identification Rule **(Appendix B)** which establishes Arizona's listing methodology, but EPA does not have authority to approve of this rule. EPA will consider the methods established in this rule when it reviews the 303(d) List Arizona submits. EPA may cite any deficiencies it raised in comments as a factor in a decision to disapprove all or part of Arizona's 303(d) List.

Within 30 days of receipt of a completed listing package, EPA must act on a state's list and priority ranking. EPA may approve or disapprove the entire list or disapprove only deficient portions. If it disapproves of a portion, EPA must within 30 days identify corrections (i.e., surface waters, pollutant(s), priority rankings) needed to make the list consistent with EPA regulations. EPA must notify the public of its decision in the *Federal Register* and in a newspaper of general circulation and request public comment. At the end of the comment period, EPA will evaluate public comments and compile a revised list. This corrected list would be sent back to Arizona to be incorporated into the water quality management plans and used as Arizona's approved 2002 303(d) List.

Table 27. 2002 303(d) List TMDL Priority Ranking and Schedule

(Submission to EPA for approval in October 2002)

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
Bill Williams Watershed																											
Boulder Creek headwaters-Wilder Creek 29 miles AZ15030202-006	Fluoride	2002											X			X				X	X	X				Medium priority. Although there are three low priority factors (the stream reach has intermittent flow (L4), the stream is remote and the fluoride standard was based on lifetime exposures and ingestion during swimming (L5), and more data and information is needed to identify sources (L6)), ADEQ will initiate this TMDL because to make efficient use of resources as staff will be monitoring TMDL effectiveness in the lower segment of Boulder Creek in 2004/2005.	Monitor 2004-2005. Initiate TMDL in 2006
Boulder Creek Wilder Creek-Copper Creek 3 miles AZ15030202-005A	Arsenic	1988						X					X		X	X				X	X					Medium priority. [NOTE: Investigations indicate that arsenic impairs the entire reach, while copper and zinc impairment occurs only between Wilder Creek and Butte Creek (below the upper tailings pile).] Boulder Creek has intermittent flow (L4) and arsenic poses a low human-health threat on this remote stream which has nominal recreation (L5); however, copper and zinc present a significant threat to wildlife (H1) due to the toxic nature of these pollutants and the magnitude of the exceedances as follows: * Dissolved copper has been measured as high as 14,400 µg/L (220 times higher than the aquatic and wildlife standard); * Dissolved zinc has been reported as high as 115,000 µg/L (300 times higher than the aquatic and wildlife standard). BLM is pursuing clean up of an abandoned mine site on this reach which is a major source of the pollutants and is supporting the development of this TMDL for all three parameters (H6). The Arizona State Land Department is interested in developing a remediation plan for contamination on property owned by that agency; ADEQ is working with the Land Department on potential funding for such projects. Arsenic, copper, and zinc TMDLs are in progress and should be ready to submit to EPA fall 2002 (M6).	Complete TMDL in 2002
	Copper	1988	X					X					X		X	X				X							
	Zinc	1988	X					X					X		X	X				X							

High = 7 Medium =

+ Alum
Harshaw
Three R

Priority

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
Alamo Lake 1,414 acres AZL15030204-0040	Dissolved oxygen	2002				X		X	X																	High priority. Low dissolved oxygen and high pH have the potential to lead to fish kills which will jeopardize a food source for the bald eagle (a federally-listed Threatened species in this area) (H4) and the significant sport fishery in this lake (H7). The Corps of Engineers is considering changes in dam operation to improve downstream habitat, and timely completion of the TMDL could assist in making management decisions (H6). ADEQ will begin preliminary investigation in 2003.	Initiate TMDL in 2003
	pH (high)	1996				X		X	X		X																
	Sulfide	1996				X		X	X									X								Low priority. A change in the sulfide standard has been submitted to EPA. If approved, it will apply to epilimnion layer (top) of the lake only, resulting in Alamo Lake meeting this standard (L2).	NA -- New standard will be met
Colorado-Grand Canyon Watershed																											
Colorado River Parashant-Diamond Creek 28 miles AZ15010002-003	Turbidity	1998			X										X			X			X	X	X	X		Low priority. ADEQ has submitted a change in standards to EPA that would replace the turbidity standard with a suspended sediment concentration standard (L2). Samples need to be collected from this reach and tributaries that feed this reach to identify sources (L6) and to relate the turbidity exceedances to the new suspended sediment concentration. Turbidity does not pose a significant threat to human or aquatic life in this naturally turbid stream (L5, L8), even though the river is federally protected as a scenic river (H3). Recent studies and dam releases have occurred because the river is not carrying sufficient suspended solids (L5). The TMDL investigation may indicate that a site-specific standard is needed due to naturally high levels of turbidity (L6). Tribal holdings in the drainage basin (L7) and long travel distance for collecting samples make completing this TMDL more complex (M5).	Begin monitoring for new standard in 2004 as part of the watershed rotation.
Virgin River Beaver Dam Wash-Big Bend Wash 10 miles AZ15010010-003	Turbidity	1990													X			X				X				Low priority. ADEQ has submitted a change in standards to EPA that would replace the turbidity standard with a suspended sediment concentration standard (L2). Samples need to be collected from this reach and tributaries that feed this reach to identify sources (L6) and to relate the turbidity exceedances to the new suspended sediment concentration. A TMDL is rated as complex as a major portion of the river drainage is in Utah and will require extensive coordination (M5).	Begin monitoring for new standard in 2004 as part of the watershed rotation.

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
	Fecal coliform	2002	X						X		X				X			X				X				High priority. Bacterial contamination of the stream presents a potential public health threat as the local community uses this reach for swimming/recreational purposes and the standard was developed for human-health protection of even short term exposures (H1, H7). ADEQ has submitted a change in standards to EPA that would replace the fecal coliform standard with a stricter *Escherichia coli* standard; however, there is insufficient *E. coli* data available to determine whether the new standard will be met. More data is needed to identify sources (L6). TMDL is complicated by a major portion of the river drainage being in Utah, the distance for collecting samples and the short holding times for bacteria samples (M5, M6). More than one designated use is impaired by not meeting this standard (M1).	Begin monitoring for new standard and TMDL development in 2004 as part of the watershed rotation.
Colorado-Lower Gila Watershed																											
Painted Rocks Borrow Pit Lake 180 acres AZL15070201-1010	Dissolved oxygen	1992																			X			X		Low priority. A 1992 diagnostic feasibility study by ADEQ investigated the causes of low dissolved oxygen. That study indicated that low dissolved oxygen is due to design and maintenance of this shallow lake and suggested strategies to improve water quality. Drought conditions have reduced lake levels and may be related to some of the low dissolved oxygen readings (L8). The lake is no longer being stocked with fish and does not have recreational uses because of historic pesticide contamination and fish consumption advisories (L5).	2007 Update report and determine need for TMDL as part of the watershed rotation.
	Fecal coliform	2002									X							X			X	X				Low priority. There is no public access, thus the public health risk due to bacterial contamination is significantly reduced (L5). ADEQ has submitted a change in standards to EPA that would replace the fecal coliform standard with a stricter *Escherichia coli* standard (L2). There is insufficient *E. coli* data available to know if that standard will be met (L6). More than one designed use is impaired by not meeting this standard (M1).	Begin monitoring for new standard in 2007 as part of the watershed rotation.

Hi

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
Little Colorado-San Juan Watershed																											
Little Colorado River Porter Tank-McDonalds Wash 17 miles AZ15020008-017	Copper	1992	X					X							X	X						X		X		High priority. Copper and silver TMDLs are a high priority due to the toxic nature of these heavy metals and the frequency they were exceeded (9 out of 11 samples exceeded the copper standard, and 2 out of 9 samples exceeded the silver standard) (H1). Data was from a USGS study concluded that the metals may be naturally elevated (L8); however, sources and natural loading concentrations need to be further studied (L6). The Little Colorado River Multiple Objective Management watershed group is interested in this TMDL (H6). The TMDL investigation is on ADEQ's work plan for 2003 (M6) in 2003, but the nature of these pollutants make this study very complex (M5).	Initiate TMDL in 2003
	Silver	1992	X					X							X	X						X		X			
Middle Gila Watershed																											
French Gulch headwaters-Hassayampa River 10 miles AZ15070103-239	Copper	1994	X								X		X		X	X				X						High priority. Although this reach is ephemeral (L4), copper, manganese, and zinc pose a significant threat to wildlife which may drink pools remaining after monsoon rains or winter storms (H1) and due to the toxic nature of these pollutants and the magnitude and duration of the exceedances as follows: * Dissolved copper was measured as high as 1200 µg/L (almost 20 times the aquatic and wildlife standard), and exceeded the standards in 80 of 135 samples (60%); * Manganese was measured as high as 47,700 µg/L (approximately 2.5 times the standard) and was exceeded in 96 of 140 samples (70%); * Dissolved zinc was measured as high as 2260 µg/L (almost 6 times the aquatic and wildlife standard), and exceeded standards in 36 of 170 samples (20%). The TMDL investigation is on ADEQ's work plan for 2003 (M6); however, the TMDL is expected to be very complex due to the nature of the pollutants (M5) and seasonal variation (M3).	TMDL study ongoing in 2003. Anticipate completion in 2004.
	Manganese	1994									X	X	X		X	X				X							
	Zinc	1994	X										X		X	X				X							
Gila River Centennial Wash-Gillespie Dam 5 miles AZ15070101-008	Boron	1992							X				X		X							X				Medium priority. This TMDL will be complex due to large number of potential sources (e.g., irrigation return flows, wastewater dischargers) and seasonal influences (M5, M3, L6). Boron may negatively impact agricultural crop production (H7); however, ADEQ is unaware of any documented impacts. Although the federally listed Yuma clapper rail has been sighted in this reach, boron levels are not exceeding the aquatic and wildlife water quality standard.	Initiate TMDL in 2005

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
Hassayampa River headwaters-Copper Creek 11 miles AZ15070103-007A	Zinc	1992	X			X							X		X	X										High priority. Zinc poses a significant wildlife threat due to the toxic nature of this pollutant as zinc exceeded standards in 3 of the 3 samples collected in this reach (H1). The zinc TMDL has completed public review process and will be submitted to EPA by September, 2002. This Phase I TMDL was complicated by the nature of the pollutant (M5) and the relationship between concentration levels and storm water runoff at abandoned mining operations (M3). A federally listed threatened species, the Mexican spotted owl, occurs in this area and could be further jeopardized by drinking from standing pools after rain events (H4).	Expect to complete TMDL in 2002
Mineral Creek Devils Canyon-Gila River 10 miles AZ15050100-012B	Beryllium	1992																X	X	X	X					Low priority. ADEQ has submitted a change in the beryllium standard to EPA that would bring this reach into compliance with the new standard (L2). When approved, the fish consumption standard would change from 0.21 µg/L to 1130 µg/L (L5). (See other actions discussed below -- (L3, L4))	NA -- New standard will be met
	Copper	1992	X			X							X		X				X	X						Low priority. Although the pollutants pose a significant risk to public health and wildlife due to their toxicity, magnitude of exceedances and frequency of exceedances (H1) (H4), a TMDL is not needed at this time due to other actions being taken to bring the stream into compliance with standards (L3). The mining operation has entered into a consent decree with EPA and has instituted actions that will bring the surface water back into compliance with applicable water quality standards. The mine monitors multiple sites on a monthly basis to evaluate the effectiveness of its actions. Further enforcement actions will be taken if compliance is not attained per consent decree (L3). Complex TMDLs to determine source loadings on this intermittent stream are not needed at this time (M3, M5, L4).	Ongoing monitoring to determine effects of corrective actions. Fixed station monitoring site on Gila River immediately downstream of Mineral Creek.
	pH	1992	X			X					X		X		X				X	X							
	Zinc	1992	X			X							X		X				X	X							
Queen Creek headwaters-Superior Mine WWTP 9 miles AZ15050100-014A	Copper	2002											X		X					X		X				Medium priority. A copper TMDL will be complex (M5) due to intermittent flows (L4), the nature of the pollutant (M5) and the probability that contamination is related to storm water runoff events (M3). The copper listing is based on only two exceedances in five samples and exceedances are just above standards; more samples are needed to identify sources and evaluate the extent of contamination (L6).	Targeted monitoring in 2003; assess need for TMDL in 2004

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
Turkey Creek headwaters-Poland Creek 30 miles AZ15070102-036	Cadmium	1992	X					X					X	X	X	X				X						High priority. Cadmium, copper, and zinc pose a significant threat to wildlife due to the toxic nature of these pollutants, and the magnitude and frequency of exceedances as follows (H1): * Dissolved cadmium was measured as high as 931 µg/L (8 times the standard), and exceeded standards in 2 of 5 samples (40%).; * Dissolved copper was measured as high as 13,600 µg/L (200 times the standard) and exceeded standards in 3 of 5 samples (60%); * Dissolved zinc was measured as high as 158,000 µg/L (more than 400 times the standard) and exceeded standards in 3 out of 5 samples. Forest Service is supporting the development of this TMDL and are developing plans to remediate mine waste piles along this reach (H6). The TMDL investigation is on ADEQ's 2003 work-plan (M6) but is complex due to the nature of metals and the length of the listed stream segment (30+ miles). Metal contamination may be localized, exceedances are storm dependent, and flow is intermittent (M3, M5, and L4).	TMDL study ongoing in 2003; anticipate completion in 2004
	Copper	1992	X					X					X	X	X	X				X							
	Zinc	1992	X					X					X	X	X	X				X							
Salt Watershed																											
Christopher Creek headwaters-Tonto Creek 8 miles AZ15060105-353	Turbidity	2002																X			X	X				Low priority. ADEQ has submitted a change in standards to EPA that would replace the turbidity standard with a suspended sediment concentration standard (L2, L5). Samples need to be collected from this reach and tributaries that feed this reach to identify sources (L6) and to relate the turbidity exceedances to the new suspended sediment concentration. Turbidity monitoring is currently occurring in support of other TMDL efforts.	Begin monitor for new standard in 2007 as part of the watershed monitoring cycle.
Tonto Creek headwaters-Haigler Creek 17 miles AZ15060105-013	Turbidity	2002																X			X	X				Low priority. ADEQ has submitted a change in standards to EPA that would replace the turbidity standard with a suspended sediment concentration standard (L2, L5). Samples need to be collected from this reach and tributaries that feed this reach to identify sources (L6) and to relate the turbidity exceedances to the new suspended sediment concentration. Turbidity monitoring is currently occurring in support of other TMDL efforts.	Begin monitor for new standard in 2007 as part of the watershed monitoring cycle.
Tonto Creek Rye Creek-Gun Creek 5 miles AZ15060105-008	Turbidity	1990																X			X	X				Low priority. ADEQ has submitted a change in designated use to EPA, changing the use from a cold water fishery to a warm water fishery. When approved the turbidity standard would be met (L2, L5). ADEQ has also submitted a change in standards to EPA that would replace the turbidity standard with a suspended sediment concentration standard (L2, L5) (see discussion for Tonto and Christopher Creeks above).	Begin monitor for new sediment standard in 2007 as part of the watershed monitoring cycle.

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
San Pedro-Willcox Playa-Rio Yaqui Watershed																											
Mule Gulch headwaters-WWTP Bisbee 4 miles AZ15080301-090A	Copper	2002	X										X		X	X				X				X		Medium priority. TMDLs are underway to address loadings on both segments of Mule Gulch and tributaries contributing significant loading. These TMDLs are complex due to the wastewater discharges, slope, intermittent and ephemeral flows, lack of rain, and natural background levels of copper (M3, M5, L4, L8). Currently ADEQ is developing site specific standards that account for loadings from naturally occurring conditions (M6, L8). The mining operation in the affected segments is implementing and continuing the develop additional Best Management Practices to address contamination issues. Copper, zinc, and low pH present a significant threat to wildlife and human health (H1) due to the toxic nature of these pollutants and the magnitude and frequency of the exceedances: * Dissolved copper was as high as 12,000 µg/L (185 times the aquatic and wildlife standard) and exceeded standards in 20 of 36 samples (55%) in Mule Gulch; * Dissolved zinc was as high as 3760 µg/L (10 times the aquatic and wildlife standard) and exceeded standards in 14 of 36 samples (39%) in Mule Gulch; * This area is a documented corridor for Mexican migrant traffic. Every summer migrants die of thirst crossing Arizona's desert and may drink from reaches of Mule Gulch with flow. Consumption of this water would be hazardous as the copper levels were up to 78 times the surface water standard for domestic water source (1000 µg/L). Cadmium and zinc would also exceed these DWS standards (cadmium = 5 µg/L and zinc = 2100 µg/L).	Site-specific standard development 2003; reassess TMDL in 2004
	Zinc	2002	X										X		X	X				X				X			
Mule Gulch WWTP Bisbee- Whitewater Draw 8 miles AZ15080301-090B	Copper	1990	X										X		X	X				X				X			Site-specific standard development 2003; reassess TMDL in 2004
	Low pH	1990	X								X		X		X	X				X				X			
	Zinc	1990	X										X		X	X				X				X			
San Pedro River Dragoon Wash-Tres Alamos 16 miles AZ15050202-002	Nitrate	1990												X	X				X							Low priority. The ADEQ WQARF (Superfund) Program is working with this site. The facility has instituted several actions to bring the surface and ground water into compliance with its standards and is conducting monthly monitoring of several sites along the San Pedro River (L3, M4). Although surface water quality is improving, cleanup will take time as there is significant contamination of the ground water which is seeping into the San Pedro (M5).	Targeted monitoring in 2004 to determine effect of corrective actions and need for TMDL

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
Santa Cruz-Rio Magdalena-Rio Sonoyta Watershed																											
Alum Gulch headwaters-ephemeral Wash 2 miles AZ15050301-581A	Cadmium	1996	X			X							X		X	X				X						Medium priority. Although this is an intermittent reach (L4), cadmium, copper and zinc contamination is a significant threat to wildlife and human health (H1) due to the toxic nature of these pollutants and the magnitude and frequency of exceedances as follows: * Dissolved copper was as high as 2,000 µg/L (30 times the aquatic and wildlife standard) and exceeded standards in 9 of 10 samples (90%). * Dissolved cadmium was as high as 220 µg/L (almost twice the aquatic and wildlife standard) and exceeded standards in 8 of 10 samples (80%). * Dissolved zinc was as high as 56,000 µg/L (150 times the aquatic and wildlife standard) and exceeded standards in 10 of 10 samples (100%) A federally listed threatened species, the Mexican spotted owl, occurs in this area and could be further jeopardized by these pollutants if drinking from standing pools after rain events (H4). This is a complex TMDL due to the nature of the pollutants (M5), exceedances are tied to runoff events (M3), natural background issues, and intermittent flow (L4). A TMDL is in progress and is expected to be submitted to EPA in 2002 (M6).	Expect to complete TMDL in 2002
	Copper	1996	X			X							X		X	X				X							
	Zinc	1996	X			X							X		X	X				X							
Harshaw Creek headwaters-ephemeral segment 10 miles AZ15050301-025A	Zinc	1988	X			X							X		X	X				X						Medium priority. Although this is an intermittent reach (L4), zinc contamination is a significant threat to wildlife and human health (H1) due to the toxic nature of these pollutants and the magnitude and frequency of exceedances as follows: * Dissolved zinc was as high as 860 µg/L (more than twice the aquatic and wildlife standard) and exceeded standards in 4 of 9 samples (about 45%). * A federally listed threatened species, the Mexican spotted owl, occurs in this area and could be further jeopardized by these pollutants if drinking from standing pools after rain events (H4). This is a complex TMDL due to the nature of the pollutants (M5), exceedances are tied to runoff events (M3), natural background issues and intermittent flow (L4). A TMDL is in progress and is expected to be submitted to EPA in 2002 (M6).	Expect to complete TMDL in 2002

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
Nogales & East Nogales Wash Mexico border-Portrero Wash 6 miles AZ15050301-011	Chlorine	1996	X																	X			X			Medium priority. Although fecal coliform and chlorine are a significant threat to human health and wildlife (H1), actions to correct the situation are dependent on ongoing international negotiations between the U.S. government, Arizona, Mexico, the cities of Nogales, AZ and Nogales, Sonora and the Mexican state of Sonora (L7). Wastewater infrastructure in Mexico is badly deteriorated and must be replaced. Chlorine is sometimes added directly to the stream on the U.S. side of the border due to raw sewage overflows from Mexico. The source loadings are known and the technical means to correct the problem have been determined. Despite the potential public health concerns, international efforts require extensive negotiations and have experienced lengthy delays (L7). Completing a TMDL in this intermittent wash (L4) would not further the process at this time. The medium priority ranking is an acknowledgment of this social-political disparity. ADEQ has submitted a change in standards to EPA that would replace the fecal coliform standard with a stricter *Escherichia coli* standard (L2). There is insufficient *E. coli* data available to know if that standard will be met.	Ongoing quarterly monitoring a fixed station. Begin monitoring for new standards in 2003.
	Fecal coliform	1998	X								X							X		X		X	X				
	Turbidity	1994													X			X		X		X	X			Low priority. ADEQ has submitted a change in standards to EPA that would replace the turbidity standard with a suspended sediment concentration standard (L2, L5). Samples need to be collected from this reach and tributaries that feed this intermittent reach (L4) to identify sources (L6) and to relate the turbidity exceedances to the new suspended sediment concentration (M5).	Begin monitoring for new standard in 2003
Portrero Creek I-10 - Santa Cruz River 5 miles AZ15050301-500B	Fecal coliform	2002	X								X							X		X		X	X			Medium priority. This intermittent creek (L4) receives fecal contamination from Nogales Wash at levels that are a threat to human health (H1); however, factors concerning international negotiations and lengthy delays (L7) (discussed above in reach 15050301-011) affect completion of a TMDL. ADEQ has submitted a change in standards to EPA that would replace the fecal coliform standard with a stricter *Escherichia coli* standard (L2). There is insufficient *E. coli* data available to know if that standard will be met.	Monitor for new standard in 2003

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
Santa Cruz River Mexico border-Nogales Intl WWTP 17 miles AZ15050301-010	Escherichia coli	2002	X					X							X					X		X	X			High priority. Completing this TMDL is a high priority because of potentially serious human health concerns (H1) for the following reasons: 1)These bacteria are indicators of fecal contamination which may include pathogens (e.g. typhoid, giardia). Some pathogenic diseases require very short contact with the water; 2) *E. coli* was measured as high as 10,000 colony forming units (CFU) (17 times the standard of 580 CFU); and 3) This area is a corridor for Mexican migrant s, who may consume or bathe in this water while crossing the desert, although the water is not protected for this use. The Friends of the Santa Cruz River, a volunteer monitoring group, are interested in maintaining high quality water in the Santa Cruz River (H6). Completing this TMDL will be complex (M5) because the probable sources are in Mexico (L7), intermittent flows (L4) the current drought will make sampling challenging, and the need for more data to identify source loads (L6).	Targeted monitoring in 2003; determine need for TMDL in 2004 (Long-term fixed station network monitoring site at the border.)
	Fecal coliform	2002	X					X			X				X			X		X		X	X			Medium priority. ADEQ has submitted a change in standards to EPA that would replace the fecal coliform standard with a stricter *Escherichia coli* standard (L2). (See E. coli listing above). A TMDL would be complex (M5) due to potential sources in Mexico (L7) and intermittent flows (L4).	Begin monitoring for new standard along with targeted monitoring in 2003
Santa Cruz River Nogales WWTP-Josephine Canyon 9 miles AZ15050301-009	Fecal coliform	2002	X					X			X							X				X	X			Medium priority. Although fecal coliform may indicate pathogenic contamination of the water (H1) and this is a corridor for Mexican migrants (see comments in reach 15050301-010) (H1) , ADEQ has submitted a change in standards to EPA that would replace the fecal coliform standard with a stricter *Escherichia coli* standard (L2) as *E coli* is more closely associated with pathogens. There is insufficient *E. coli* data available to know if the new standard will be met (L6). The source of the *E. coli* is believed to be the Nogales International Wastewater Treatment Plant. The US and Mexican State Departments continue to negotiate construction and operation of an upgraded facility (see discussion in Nogales Wash) (L7). The Friends of the Santa Cruz, a volunteer monitoring group, is interested in having high quality water (H6) as the Santa Cruz River is used for recreational purposes in this reach (H7). If the sole source of contamination is the treatment plant, completion of a TMDL would have limited value as the plant upgrade would resolve the issues. ADEQ will continue monitoring along with other investigations in the area. The medium ranking is an acknowledgment of the social-political stalemate for this segment.	Begin monitoring for new standard in 2003 (long-term FSN site)

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
Santa Cruz River Josephine Cyn-Tubac Bridge 5 miles AZ15050301-008A	Fecal coliform	2002	X					X	X		X							X				X	X			Medium priority. NOTE: See comments in reach number 15050301-009 above.	Begin monitoring for new standard in 2006 as part of the watershed rotation.
	Turbidity	2002				X		X	X						X			X				X	X			Medium priority. ADEQ has submitted a change in standards to EPA that would replace the turbidity standard with a suspended sediment concentration standard (L2). Samples need to be collected from this ephemeral stream and tributaries that feed this reach to identify sources (L6) and to relate the turbidity exceedances to the new suspended sediment concentration (M5). A federally listed endangered species, the Gila topminnow, has been sighted in this reach and may be further jeopardized by the causes of the turbidity (H4). The Friends of the Santa Cruz River, a volunteer monitoring group, are interested in efforts to improve water quality in the river (H6) as this segment of the river is used for recreational purposes (H7).	Begin monitoring for new standard in 2006 as part of the watershed monitoring cycle.
Santa Cruz River Tubac Bridge-Sopori Wash 9 miles AZ15050301-008B	Fecal coliform	2002	X			X		X			X							X				X	X			Medium priority. NOTE: See comments in reach number 15050301-009 above.	Begin monitoring for new standard in 2006 as part of the watershed monitoring cycle.

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
Three R Canyon headwaters-ephemeral segment 5 miles AZ15050301-588A	Cadmium	1994	X			X							X		X	X				X						Medium priority. Although this is an intermittent reach (L4), cadmium, copper and zinc contamination is a significant threat to wildlife and human health (H1) due to the toxic nature of these pollutants and the magnitude and frequency of exceedances as follows: * Dissolved copper was as high as 89,000 µg/L (1370 times the aquatic and wildlife standard) and exceeded standards in 10 of 10 samples (100%). * Dissolved cadmium was as high as 143 µg/L (1.25 times the aquatic and wildlife standard) and exceeded standards in 8 of 10 samples (80%). * Dissolved zinc was as high as 2790 µg/L (7 times the aquatic and wildlife standard) and exceeded standards in 9 of 10 samples (90%). * A federally listed threatened species, the Mexican spotted owl, occurs in this area and could be further jeopardized by these pollutants if drinking from standing pools after rain events (H4). This is a complex TMDL due to the nature of the pollutants (M5), that exceedances being tied to runoff events (M3), natural background issues and intermittent flow (L4). A TMDL is in progress and is expected to be submitted to EPA in 2002 (M6).	Expect to complete TMDL in 2002
	Copper	1994	X			X							X		X	X				X							
	Zinc	1994	X			X							X		X	X				X							
Upper Gila Watershed																											
Gila River Bonita Creek-Yuma Wash 6 miles AZ15040005-022	Turbidity	1996				X									X			X				X				Medium priority. ADEQ has submitted a change in standards to EPA that would replace the turbidity standard with a suspended sediment concentration standard (L2). Samples needs to be collected from this reach and tributaries that feed this reach to identify sources (L6) and to relate the turbidity exceedances to the new suspended sediment concentration. A federally listed threatened species, the Loach minnow, is in this reach and may be sensitive to turbidity exceedances or causes associated with turbidity (H4). This TMDL is complex because the upper drainage is in New Mexico (M5). A recently published fluvial geomorphology study on the Gila River in New Mexico may support this TMDL analysis.	Begin monitoring for new standard in 2005
San Francisco River Limestone Gulch-Gila River 13 miles AZ15040004-001	Turbidity	1992													X			X				X				Low priority. ADEQ has submitted a change in standards to EPA that would replace the turbidity standard with a suspended sediment concentration standard (L2). Samples need to be collected from this reach and tributaries that feed this reach to identify sources (L6) and to relate the turbidity exceedances to the new suspended sediment concentration (L2, M5).	Begin monitoring for new standard in 2005

Surface Water Identification	Pollutant	Year First Listed	H 1 *	H 2	H 3	H 4 *	H 5	H 6	H 7	H 8	M 1	M 2	M 3	M 4	M 5	M 6	L 1 *	L 2 *	L 3 *	L 4	L 5	L 6	L 7 *	L 8	L 9	RANKING AND DISCUSSION	TIME TABLE **
Verde Watershed																											
Beaver Creek Dry Beaver Creek-Verde R. 9 miles AZ15060202-002	Turbidity	1996				X		X							X			X				X				Medium priority. ADEQ has submitted a change in standards to EPA that would replace the turbidity standard with a suspended sediment concentration standard (L2). Samples need to be collected from this reach and tributaries that feed this reach to identify sources (L6) and to relate the turbidity exceedances to the new suspended sediment concentration. Two federally listed threatened and/or endangered species have been sighted in this reach, the Spikedace and the Southwest willow flycatcher. The Spikedace may be sensitive to excessive turbidity (H4).	Begin targeted monitoring in 2003; evaluate need for TMDL 2004
Oak Creek West Fork of Oak Cr.-Dry Cr. 24 miles AZ15060202-018B	Turbidity	2002																X								Low priority. ADEQ has submitted a change in designated use to EPA, changing the use from a cold water fishery to a warm water fishery (L2). When approved, sample results indicate that the turbidity standard would be met. (ADEQ has also submitted a change in standards to EPA that would replace the turbidity standard with a suspended sediment concentration standard (L2)).	NA – New standard will be met

X = Factor present. X = most significant factors. Note that factors that frequently out rank others are shown with an asterisk (*).

** Date shown is when action is to be initiated. Time table will be adjusted based on availability of flowing water, as Arizona is currently in a drought, and availability of resources to complete TMDLs.

High Priority Factors:

H1. Substantial threat to health and safety of humans, aquatic life, or wildlife based on:
- a. Number and type of designated uses impaired,
- b. Type and extent of risk from the impairment to human health or aquatic life,
- c. Pollutant causing the impairment, or
- d. Severity, magnitude, and duration the surface water quality standard was exceeded.

H2. An new or modified individual NPDES or AZPDES permit is sought for discharge to the impaired water.
H3. Surface water is listed as a Unique Water or is part of an area classified as a "wilderness area", "wild and scenic river" or other federal or state special protection of the water resource.
H4. Surface water contains a species listed as "threatened" or "endangered" under the federal Endangered Species Act and the presence of the pollutant in the surface water is likely to jeopardize the listed species.
H5. A delay in conducting the TMDL could jeopardize ADEQ's ability to gather sufficient credible data necessary to develop the TMDL.
H6. There is still significant public interest and support for development of a TMDL.
H7. The surface water or segment has important recreational and economic significance to the public.
H8. The pollutant has been listed for eight years or more (starting with the 2002 listing).

Medium Priority Factors:

M1. The surface water fails to meet more than one designated use.
M2. The pollutant exceeds more than one surface water quality standard.
M3. The exceedance is correlated to seasonal conditions caused by natural events such as storms, weather patterns, or lake turnover.
M4. It may take more than two years for proposed actions in the watershed to result in the surface water attaining applicable water quality standards.
M5. The type of pollutant and other factors relating to the surface water or segment make the TMDL very complex.
M6. ADEQ's administrative needs, including TMDL schedule commitments with EPA, permitting needs, or basin priorities that require completion of the TMDL.

Low Priority Factors:

L1. ADEQ has formally submitted a proposal to delist the surface water or pollutant to EPA. If ADEQ makes the submission outside of listing process cycle, the change in priority ranking will not be effective until EPA approves the report.
L2. ADEQ has modified or formally proposed a modification to the applicable surface water quality standard or designated use which would result in the surface water no longer being impaired, but the modification has not yet been approved by EPA.
L3. The surface water is expected to attain surface water quality standards due to any of the following:
    a. Recently instituted treatment levels or best management practices in the drainage area,
    b. Discharges or activities related to the impairment have ceased, or
    c. Actions have been taken and the controls are in place or scheduled for implementation that are likely to bring the surface water back into compliance.
L4. The surface water is ephemeral or intermittent. ADEQ shall re-prioritize the surface water if the presence of the pollutant in the listed water poses a threat to the health and safety of humans, aquatic life, or wildlife using the water (H1) or the pollutant is contributing to the impairment of a downstream, perennial surface water.
L5. The pollutant poses a low ecological and human health risk.
L6. Insufficient data exists to determine the source of the pollutant load.
L7. The uncertainty of timely coordination with national and international entities concerning international waters.
L8. Naturally occurring conditions are a major contributor to the impairment.
L9. No documentation or effective analytical tools exist to develop a TMDL for the surface water with reasonable accuracy.

VI. Ground Water Quality: Out of Sight Not Out of Mind

How good is Arizona's ground water quality?

Most of Arizona's ground water meets aquifer water quality standards, and thus, is suitable for drinking water use. Ground water quality information by watershed is provided in tables, maps, and text in Volume II. A statewide overview is provided in this chapter.

How Does ADEQ Characterize Ground Water? – ADEQ's Ambient Ground Water Monitoring Program uses a statistically-based, comprehensive ground water monitoring approach to characterize regional water quality conditions. Wells are randomly selected within a ground water basin or other hydrologically defined area to support statistically valid assumptions during data interpretation. Using this method, a ground water basin is divided into monitoring "cells," the number of cells depends on the complexity of the watershed activities, hydrology, and geology. A suitable well is randomly selected and monitored in each cell to represent water quality for that area.

Since 1995, ADEQ has completed seven (7) ground water basin studies and has ongoing studies in eight (8) more basins **(Figure 25).** Brief summary reports for each of the basin studies are included Volume II, within the watershed studies. These studies are also reflected in the ground water monitoring maps. As these maps show, many areas have few if any wells monitored while areas where basin studies have occurred have many wells monitored.

After baseline water quality conditions have been determined, a few wells within the ground water basin are selected to represent ground water conditions for long-term trend analyses. These wells are monitored at a minimum of once every five years.

Index Wells and Targeted Monitoring -- Ground water data used in this assessment report was collected by multiple programs within ADEQ, US Geological Survey, the Salt River Project, and the Arizona Department of Water Resources (ADWR). This data does <u>not</u> include public drinking water samples collected by the facility as most of that data is collected after treatment and storage, and is frequently a mixture of well sources.

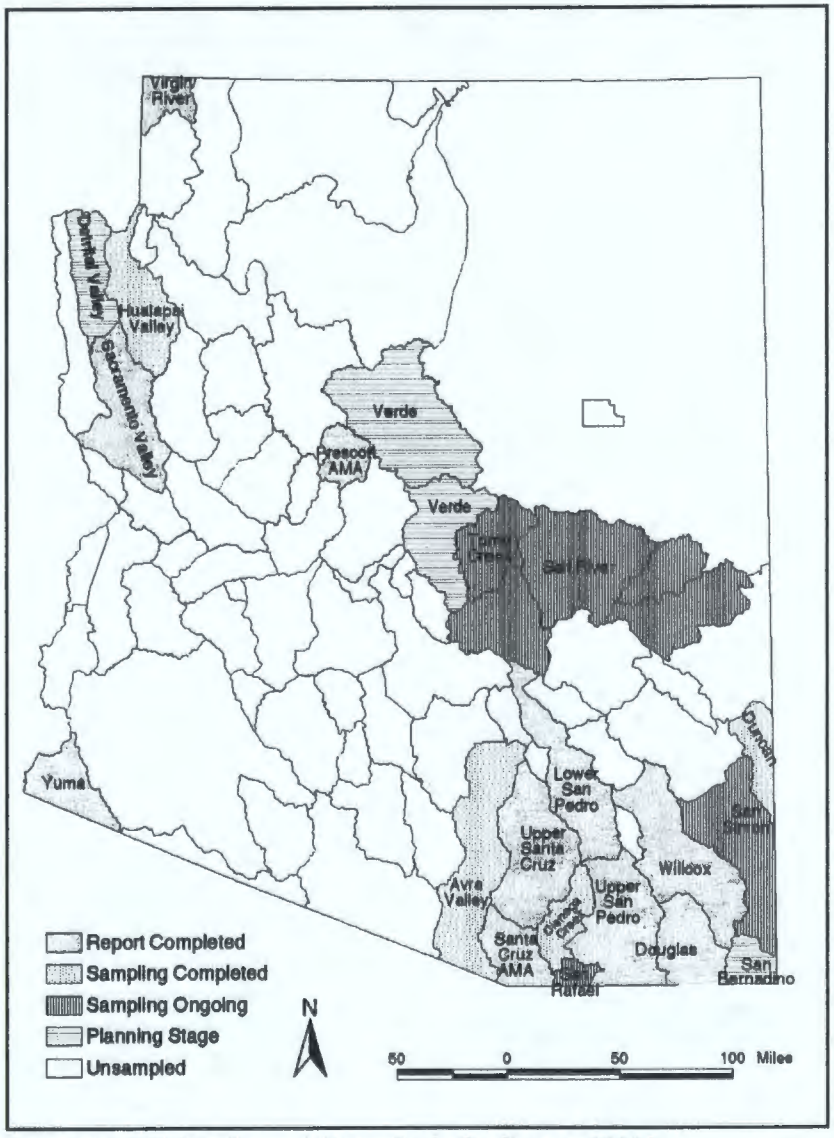


Figure 25. ADEQ's Ground Water Basin Studies as of 2001

The "targeted monitoring data" may be negatively biased, as investigations of ground water problems prompted the collection of at least some of this data. However, most wells sampled had acceptable quality water.

Two agencies, ADWR and ADEQ, collected the "index well" data. The distribution of index wells is related to the ground water monitoring methods used by each of the monitoring agencies. ADWR selects a small subset of wells to sample within each ground water basin across the state and monitors these wells annually. As already discussed, ADEQ conducts a comprehensive survey of a ground water basin based on a stratified random sampling of wells throughout the basin.

Data Analyses – Ground water quality was evaluated in this report by:

- Illustrating statewide which index wells exceeded an aquifer water quality protection standard **(Figure 26)**;
- Illustrating within a watershed which wells exceeding a standard;
- Classifying general ground water quality within a watershed by looking at concentrations of:
  - Total dissolved solids, and
  - Nitrate.

For this assessment, the last five years (Oct 1995-Oct 2000) of ground water monitoring data stored in ADEQ's Water Quality Database were assessed. Statewide ground water monitoring data are summarized in **Table 28**. Constituents monitored were grouped into the following categories: radiochemical, fluoride, metals, nitrate, volatile organic chemicals (VOCs), semi-volatile organic chemicals (SVOCs), and pesticides. The "total number of wells" indicates how many wells were tested for each parametric group. Because wells are sampled for varying constituents, the "total number of wells" for each parametric group varies.

If a well exceeded a standard during the past five years for a parametric group, the well was counted as exceeding standards. However, this does not necessarily mean that the well water currently exceeds the standard.

All laboratory results reported as "less than" the detection level or "non-detection" were counted as in compliance with the standards.

Ground Water Standards – The Aquifer Water Quality Standards used in this assessment are shown in **Appendix C.** Generally these ground water standards are identical to the Safe Drinking Water Standards established for public water systems as well as surface water standards with the Domestic Water Source designated use.

Classifying Water Quality – The concentration of some parameters in well water can be used to generally classify the quality of ground water in a region. The concentration of total dissolved solids (TDS) and nitrate in ground water are compared across each watershed in Volume II using the following classification systems.

- **Total Dissolved Solids** – The US Geological Survey classifies waters according to the following scale:

<500-999 mg/L	fresh
1000-2999 mg/L	slightly saline
3000-10,000 mg/L	moderately saline
>10,000 mg/L	very saline or briny

  The US Environmental Protection Agency has set Secondary Maximum Contaminant Level (SMCL) for TDS at 500 mg/L due to the off-flavor drinking water has above this level. This is a guidance level, not a standard, and is not set due to a human-health concern but rather for aesthetic purposes.

  For irrigation purposes, the Salt River Project's annual water quality report recognizes that salinity has effects on crop yield according to the following scale:

<500 mg/L	no problems with crop yield
500-2000 mg/L	increasing problems with crop yield
>2000 mg/L	severe problems with crop yield

- **Nitrate** – In Arizona, nitrate in ground water are normally less than 3 mg/L. Occurrences of nitrate greater than 5 mg/L are frequently due to anthropogenic sources (historic agriculture practices, septic systems, and other sewage disposal practices). Drinking water containing nitrate above 10 mg/L should not be consumed by babies or nursing mothers; therefore, an aquifer water quality standard has been set at this level. Many of the wells exceeding the 10 mg/L nitrate standard were from shallow agricultural wells that are not currently used for drinking water purposes.

Table 28. Statewide Ground Water Monitoring – October 1995 to October 2000

MONITORING DATA TYPE	PARAMETER OR PARAMETER GROUP	NUMBER OF WELLS			PERCENT OF WELLS EXCEEDING STANDARDS
		SAMPLED	SYNTHETIC CONSTITUENT DETECTED*	EXCEEDING STANDARDS	
INDEX WELLS	Radiochemicals	180		23	13%
	Fluoride	361		15	4%
	Metals/Metalloids	362		21	6%
	Nitrate	363		24	7%
	VOCs + SVOCs	165	10	0	0%
	Pesticides	166	0	0	0%
TARGETED MONITORING WELLS	Radiochemicals	97		9	9%
	Fluoride	522		68	13%
	Metals/metalloids	744		47	6%
	Nitrate	628		84	13%
	VOCs + SVOCs	559	267	182	32%
	Pesticides	458	5	0	0%

VOCs = volatile organic compounds; SVOCs = semi-volatile organic compounds.

*The detection of a synthetic constituent is noted because some pesticides, VOCs, and SVOCs do not have standards; however, these human-made substances are not naturally occurring in the ground water.

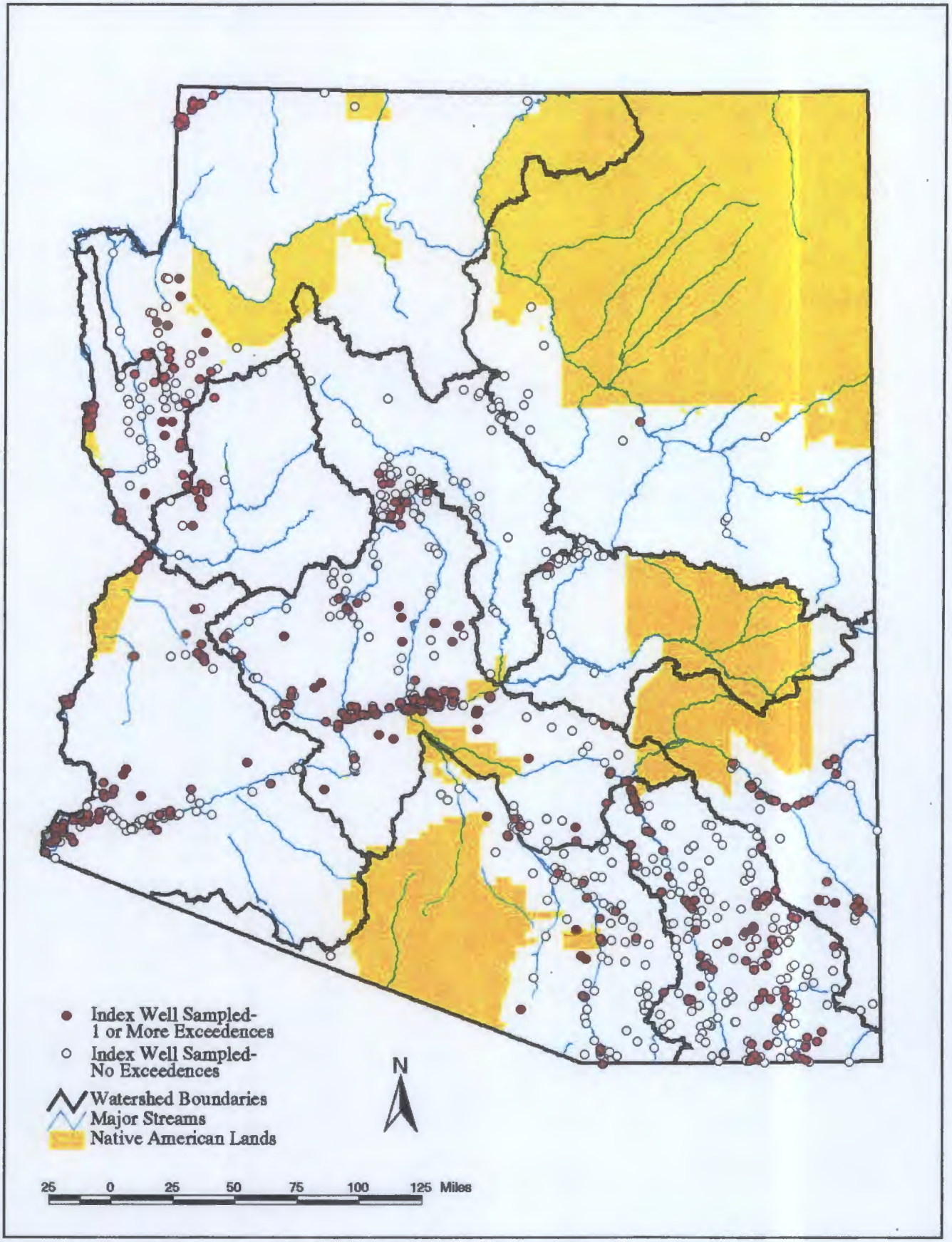


Figure 26. Index Wells Exceeding an Aquifer Water Quality Standard – 1996-2000

Do ground water and surface water contamination problems differ?

Pollutants --There are several pollutants that are of greater concern for ground water quality than surface water quality. These include volatile and semi-volatile organic compounds (VOCs and SVOCs), nitrate, fluoride, pesticides, petroleum hydrocarbons, and radiochemicals. Fluoride and radiochemicals are naturally occurring but have been detected at levels that exceed health-based standards. Nitrate and bacteria can be associated with both natural and anthropogenic sources. VOCs, SVOCs, hydrocarbons, and pesticides are synthetic compounds and detection of these human-derived compounds at any level in groundwater is cause for concern.

- **Volatile and semi-volatile organic compounds** have contaminated ground water in metropolitan areas of Arizona because of historic disposal practices for industrial solvents and dry-cleaning chemicals. High technology manufacturing facilities, such as electronics, aerospace, and military facilities, have used many solvents for several decades. Improper use and disposal practices have been documented for more than 50 years. Fortunately occasional surface spills seldom contaminate ground or surface water since these chemicals are volatile in nature.

- **Pesticide detections** in Arizona's ground water are rare but notable. Historic use of ethylene dibromide (EDB) and dibromo-chloropropane (DBCP) primarily in citrus groves resulted in detection of these compounds in ground water 20 years ago; however, these compounds are rarely detected today. Currently registered pesticides are formulated to volatilize or degrade into nontoxic by-products.
- **Petroleum hydrocarbons**, primarily originating from leaking underground storage tank sites, are a significant source of soil and ground water contamination in Arizona. These sites are found across the state, but are concentrated in the urban areas and along major transportation corridors.

- **Radioactive elements**, such as uranium, radon, and radium, occur naturally in the soil and water across Arizona. In some locations their concentrations are elevated above drinking water standards.

- **Nitrate and bacterial** contamination of ground water in Arizona are most frequently related to improper wastewater disposal and agricultural fertilizing practices, especially in areas with inadequate soils or shallow depth to groundwater. Poor well construction and seals can be a route for these pollutants to directly enter ground water. Most microorganisms are attenuated by passing through a few feet of soil; however, soil generally has no effect on slowing downward transport of nitrate.

Sources of Contaminants in Ground Water – Most groundwater contamination in Arizona has been due to historic practices and naturally occurring elevated levels of some parameters. ADEQ's Aquifer Protection Permit requirements, along with other state and federal permit requirements, have greatly reduced the chance of ground water contamination due to discharges. The protection of ground water from nonpoint sources is largely unregulated and dependent on voluntary application of Best Management Practices and efforts such as education and financial assistance programs.

VII. What is Arizona Doing about Water Quality Problems?

Water quality protection programs are based on federal and state laws, which provide a framework for comprehensive water quality protection. Three federal and state regulations provide the foundation for protecting Arizona's water resources:

- **The federal Clean Water Act** – establishes a national goal to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. This act was amended in 1987 to include state nonpoint source management programs that address reduction of pollution associated with activities that do not have end-of-pipe discharge points and can have discharges that are dispersed over large areas (e.g., agriculture, urban runoff).

- **The federal Safe Drinking Water Act** -- requires that states develop programs to protect surface and ground water used for public drinking water systems through source water protection programs, and to ensure the delivery of safe water to these public systems.

- **The Arizona Environmental Quality Act** – gives ADEQ authority to develop state environmental protection programs for both surface and ground water that are not mandated under the federal acts (e.g., Aquifer Protection Permits, drywall registration, Pesticide Contamination Program, installation and remediation of Underground Storage Tanks and ground water monitoring).

Arizona's water quality protection programs are summarized in **Appendix E**. Further information about these programs can be obtained at ADEQ's web site: http://www.adeq.state.az.us

This section will discuss the following programs established to identify and mitigate water quality problems in Arizona:

- The monitoring program,
- The Total Maximum Daily Load Program,
- Remediation Programs (Superfund and others), and
- Arizona's Mexican Border Program.

ADEQ's watershed approach provides opportunities for direct public involvement in mitigation activities, and better coordination of water quality and quantity improvement programs (see discussion in Volume II).

How to assess a big state with limited resources

Arizona's Comprehensive Monitoring Program – A variety of monitoring techniques are used to provide comprehensive statewide water quality assessments of perennial surface waters and ground water. This includes a combination of targeted and statistically-based monitoring designs. To monitor perennial surface waters, ADEQ looks at water chemistry, chemical concentrations in fish tissue, bioassessments of macroinvertebrate community, and physical-habitat conditions. At this time, assessments are primarily based on the water chemistry.

The lack of flowing water in ephemeral and some intermittent surface waters, greatly limits the possibility to monitor or assess these waters. New assessment tools (e.g., contaminated sediment or physical integrity standards) will need to be developed before these waters can be routinely monitored and assessed. Although ADEQ has been working on physical integrity criteria for several years, it will take several more years before the physical integrity data can be used definitively for assessments.

Developing bioassessment criteria has also been a high priority during the past 10 years. It is anticipated that narrative implementation procedures or numeric standards will be developed before the next assessment that will facilitate assessments based on narrative standards including biocriteria and habitat assessments.

Thus far, statistically-based or probability-based monitoring design, encouraged by EPA, has not been employed by Arizona. Inferring water quality assessments for a watershed or entire state based on samples collected at a few (i.e., 30 sites) does not appear to be applicable in a state with limited and discontinuous perennial flows and a high diversity of geologic and ecologic conditions. This type of monitoring generally relies on a larger variety of assessment tools than Arizona has developed, such as bioassessments, habitat assessments, and toxicity testing.

A number of focused monitoring programs are integrated to create Arizona's comprehensive monitoring program. The location of a sample site, the frequency of monitoring, the parametric coverage, and the monitoring protocols are critical design factors in accurately determining water quality. These are primarily determined by the sampling objective. The monitoring objective for each of ADEQ's monitoring programs is described below.

Ambient Surface Water Monitoring – The objectives for this program are:

- Characterize water quality across a region (normally a watershed),
- Determine whether perennial streams and lakes are attaining numeric and narrative surface water quality standards and identify standards not being met;
- Determine long-term reference conditions to support bioassessments and antidegradation policy;
- Identify long-term trends in water quality; and
- Characterize the trophic status of lakes and reservoirs.

The following monitoring programs are involved in this type of monitoring:

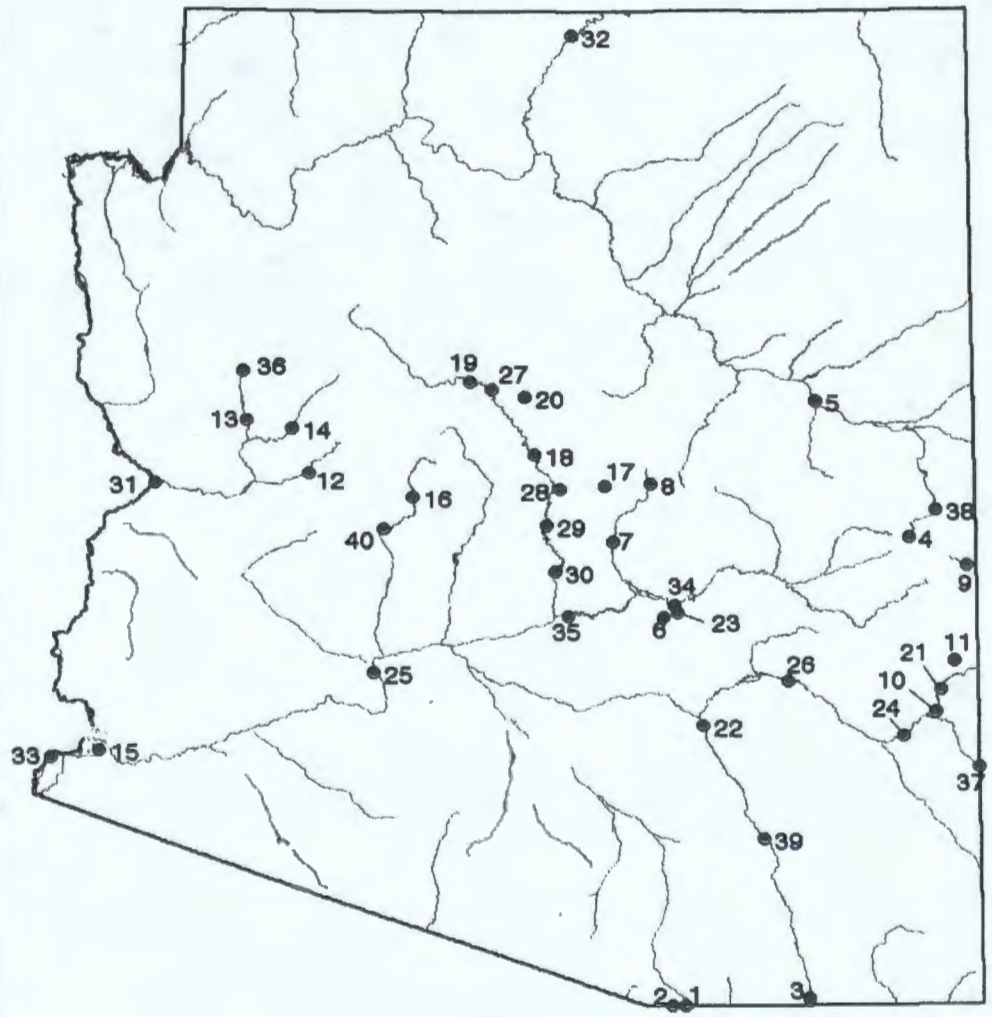
- Watershed characterization monitoring -- Representative sampling sites are selected within a watershed to provide information about perennial streams in the targeted watersheds, and where appropriate, the quality of water entering Arizona from other states or Mexico. Analytical suites are collected at each site quarterly for one year (see analytical suite description in the text box). Where appropriate, macroinvertebrate community and physical habitat measurements are also collected.
- Ambient lake monitoring – Lakes are sampled on a quarterly basis for one year for the analytical suite and for indicators of over-enrichment. Multiple sampling sites and depth profiles (measurements at one meter intervals) are used to characterize water quality. Because nutrient over-enrichment is a problem at most lakes (although not the major river reservoirs), monitoring is often focused on the four basic indicators of over-enrichment: total phosphorus, total nitrogen, algal chlorophyll and Secchi depth.
- Reference condition monitoring – These long-term sites characterize regional, least disturbed conditions to support bioassessments or other analysis. Macroinvertebrate bioassessment reference sites are monitored during the spring when macroinvertebrate communities should be thriving, and because the warm and cold water Index of Biological Integrity were derived based on monitoring only during this season. Analytical suites are also collected at these sites.
- Unique Waters monitoring – These sites provide baseline water quality conditions to determine statistically-significant changes in water quality. This monitoring occurs in waters classified or proposed as Unique Waters as part of the ambient stream watershed monitoring or as part of a special investigation in support of a proposed listing. Analytical suites are collected at these sites quarterly to determine seasonal variation.
- Long-term trend monitoring -- Fixed long-term sites are monitored to determine trends in water quality **(Figure 27)**. Trend sites, representative of water quality throughout a stream, lake, or watershed, are monitored quarterly every year for a minimum of 10 years. Analytical suites are collected at these sites. Macroinvertebrate samples are not usually collected. ADEQ contracts with USGS to assist in monitoring some of these sites.

Analytical Suite

Analytes being tested will vary based on the monitoring purpose. The following suite of analytes are collected at ambient monitoring sites:

Field data:	Dissolved oxygen, pH, specific conductance, stream flow, turbidity, air temperature, water temperature, site characteristics, photographs. For lakes add redox, secchi depth, depth (not flow), and chlorophyll a.
General chemistry	Specific conductance, pH, calcium, magnesium, sodium potassium, chloride, sulfate, fluoride, turbidity, total dissolved solids, total suspended solids, hardness, carbonate, bicarbonate, alkalinity (total and phenolphthalein). For lakes add chlorophyll a and algae identification.
Nutrients:	Ammonia (as nitrogen), phosphorus (total as phosphorus), nitrate/nitrite (total as nitrogen), total Kjeldahl nitrogen.
Metals: (total and dissolved)	Antimony, arsenic, barium, beryllium, boron (total), cadmium, chromium, copper, iron (total), lead, mercury, manganese (total), nickel, selenium, silver, thallium, zinc.
Bacteria:	Fecal coliform and *Escherichia coli*. (In lakes, collecting only *Escherichia coli*).

In addition, suspended sediment concentration will be collected at all future ambient sites.



#	Stream	Description
1	Santa Cruz River	at Mexican border
2	Nogales Wash	in Nogales, AZ
3	San Pedro River	at Palominas
4	West Fork Little Colorado	at Government Springs
5	Little Colorado	at Woodruff
6	Pinto Creek	at Henderson Ranch
7	Tonto Creek	above Gun Creek
8	Tonto Creek	below Christopher Creek
9	San Francisco River	above Luna Lake
10	San Francisco River	below Clifton
11	Blue River	at Juan Miller Road
12	Santa Maria	at Highway 93
13	Big Sandy	at Highway 93
14	Burro Creek	below Boulder Creek
15	Gila River	near Dome
16	Hassayampa	near Wagoner
17	East Verde River	at highway 87
18	Verde River	at Beasley Flat
19	Verde River	at Perkinsville
20	Oak Creek	at Red Rock Crossing
21	San Francisco River	above Clifton
22	San Pedro River	Nature Conservancy
23	Pinal Creek	at Inspiration Dam
24	Gila River	head of Safford Valley
25	Gila River	above Gillespie Dam
26	Gila River	at Calva
27	Verde River	near Clarkdale
28	East Verde River	near Childs
29	Verde River	below Tangle Creek
30	Verde River	below Bartlett Lake
31	Colorado River	below Parker Dam
32	Colorado River	at Lee's Ferry
33	Colorado River	at Northern Mexican border
34	Salt River	near Roosevelt Lake
35	Salt River	below Stewart Mountain Dam
36	Trout Creek	near Wikieup
37	Gila River	at Old Safford Bridge
38	Little Colorado River	near Springerville
39	San Pedro River	at Cascabel
38	Hassayampa River	at Box Canyon

Figure 27. Fixed Long-term Monitoring Sites in Arizona – 2002

Targeted Surface Water Monitoring -- This monitoring program focuses on waters where pollution is suspected or known to exist. The frequency and types of constituents monitored are project-specific. The objectives of this monitoring are to:

- Determine whether exceedances are persistent or recurring, and if so,
- Determine the probable extent of contamination, critical flow, climatic or seasonal conditions, and sources.

Targeted monitoring is conducted by several programs within ADEQ, including:

- TMDL Program monitors surface waters on the 303(d) List of impaired waters. Monitoring is used to determine sources of the pollutant, critical conditions, extent of the contamination, and appropriate mitigation strategies.

- The new Targeted Sampling Program will monitor waters on the Planning List that have insufficient current credible data to make an assessment. This program will also be coordinated with the TMDL monitoring team to evaluate the effectiveness of TMDL strategy implementation. The targeted monitoring team will collect samples at the original monitoring site, as well as upstream and downstream of the site, during critical flow and climatic or seasonal conditions related to the previous exceedances. The frequency and type of monitoring data collected will be determined on a site-by-site basis.

- The Priority Pollutant Program primarily monitors fish tissue and sediment for pollutants that bioaccumulate and may pose a significant human-health or ecological risk.

- Complaint, compliance, and special investigations monitoring, done in conjunction with ADEQ's Enforcement Team is triggered by citizen complaint, permit violations, and potential for contamination due to discharges of contaminants.

- Effectiveness monitoring sites are selected to determine the success of implementing Best Management Practices, permit limits, or other mitigation actions within a watershed. This includes monitoring to determine effectiveness of TMDL strategy implementation. Baseline monitoring is needed prior to implementation to determine natural concentration and variation in the parameter of concern and to allow a statistically-based assessment of effectiveness.

How Are Surface Water Monitoring Sites Selected? – Site selection will depend on the objectives of the monitoring program but all sites are selected to be representative of water quality conditions within the stream or lake. Where possible, ambient monitoring sites are at or near US Geological Survey or other agency discharge gaging stations so there will be continuous stream flow records at the sample site. ADEQ's ambient monitoring sites are typically selected to be in perennial, wadeable surface waters.

Lake sampling sites are selected based on lake size and lake morphology. Lakes with less than 20 acres generally have a minimum of one sample location near the dam, near maximum depth. Sites for larger lakes, or lakes with complex morphology, are chosen to represent the varying conditions within the lake.

Access limitations must be considered. Steep canyon walls, lack of roads or trails, or obstacles to rafting make some sites inaccessible or impractical considering the amount of monitoring equipment that must be transported to and from the site. In addition, private ownership of the shoreline or part of the access road may make the site inaccessible.

Site selection protocols for each ADEQ monitoring program are defined in quality assurance plans and sampling analysis plans. General criteria are also included in published protocol documents.

Scheduling and Prioritizing Monitoring – Over the next few years, the targeted monitoring team will focus its effort on monitoring waters listed on the Planning List. Prioritization and long-term scheduling will be essential as the first Planning List is extensive and ADEQ wants to maintain its other monitoring programs. It will be necessary to coordinate with other agencies (e.g., USGS, US Fish and Wildlife Service, National Parks Services, AZ Game and Fish Dept).

- Watershed characterization monitoring -- To maximize the quantity and quality of data available for assessments, ADEQ focuses its resources on an intensive survey of two watersheds per year (generally a wetter and drier watershed are paired) while maintaining a statewide fixed station network. A five-year rotating schedule has been established so that every year two of the ten watersheds will be more intensively monitored. Generally, 15 to 20 monitoring sites are

selected within each watershed on perennial waters to characterize water quality. The watershed schedule is shown in **Table 29.**

Table 29. Arizona's Watershed Schedule

Watersheds	Focus Years
Salt and Middle Gila	2002, 2007
Colorado-Lower Gila and Bill Williams [Verde and Bill Williams starting in 2008]	2003, 2008
Verde and Colorado-Grand Canyon [Colorado-Lower Gila and Colorado-Grand Canyon starting in 2009]	1999, 2004, 2009
San Pedro-Willcox-Rio Yaqui and Upper Gila (San Carlos-Safford-Duncan)	2000, 2005, 2010
Little Colorado-San Juan and Santa Cruz-Rio Magdalen-Rio Sonoyta	2001, 2006, 2011

- Prioritization of the 303(d) List – As discussed in more detail in Chapter V, the priority for completing a TMDL is established for each surface water on the 303(d) List. As established in the Impaired Waters Identification Rule **(Appendix B)**, that ranking reflects the relative value and benefits of the surface water as well as the potential threat to human health, aquatic life, and wildlife. High, medium, and low priorities can be summarized as follows:

High priority:

- Threat to human health, aquatic life, or wildlife as judged by:
  a. Issuance of a beach closure, fish consumption advisory, drinking water advisory, fish kills;
  b. The number of designated uses impaired;
  c. The potential risk based on the type of pollutant(s) causing the impairment. (For example, bacteria, toxic chemicals, chemicals with a potential for bioaccumulation being more of a concern than other pollutants); and
  d. Magnitude of the impairment. (For example, if pollutant concentration level is at twice the standard).
  e. Duration of impairment.
- Possibility of a NPDES / AZPDES permit issuance being delayed until the TMDL is completed;
- Surface water is protected by a special designation by the state or federal agency (e.g., Unique Water, Wilderness, etc.)
- Surface water contains a federally listed Threatened or Endangered Species and the pollutant of concern is likely to jeopardize the listed species;
- Delay in conducting the TMDL could jeopardize ADEQ's ability to gather sufficient credible data;
- Degree of public interest and support for developing the TMDL;
- Water has an important economic or recreation significance to the public; or
- Length of time that the surface water has already been on the list as all TMDLs must be completed within 15 years of their first listing (using the 1998 list as the first list in this case);

Medium priority:

- Pollutant of concern exceeds more than one standard or impairs more than one designated use;
- TMDL is complex due to seasonality of impairment, nature of pollutant, or involvement of other states or nations;
- Regulatory controls or other actions should result in attainment of water quality standards, but may take more than 2 years; or
- Administrative needs of the Department.

Low priority:

- Surface water has been proposed for delisting;
- A change in a water quality standard or designated uses has been formally submitted to EPA that would result in attainment of standards;
- Regulatory controls or other actions should result in attainment of water quality standards within 2 years;
- Surface water is ephemeral or intermittent and does not contribute to impairment of a downstream perennial surface water;
- Pollutant poses a low ecological or human health risk:
- A lot more data are needed to base a TMDL;
- International or interstate issues;
- Natural background conditions are a major source of impairments; or
- Proper technical tools to develop a TMDL are not available.

TMDLs will be initiated within the first two years following the list being approved by EPA for surface waters identified as "high priority." All other waters ranking medium or low priority have been scheduled to begin development of the TMDL within the next 5-year watershed cycle. The 303(d) List in Chapter V identifies the priority ranking, the schedule for initiating a TMDL, and the status of any TMDL already in progress. The fact that Arizona is in the fourth year of a drought poses an additional obstacle that may delay obtaining sufficient data during critical conditions for completing TMDLs as scheduled.

- Prioritization of the Planning List – The factors used to prioritize TMDLs are also relevant to the Planning List, except that no designated uses have been assessed as "impaired." In addition to those factors identified above, Planning List prioritization considers:

  - The number of exceedances compared to the number of samples taken, and the potential for completing the sample collection necessary to make an assessment;
  - Whether there are critical conditions (season, precipitation, activity in the watershed) when exceedances occur, and schedule sample collection so these conditions are represented;
  - Watershed management rotation, when listed due to insufficient data rather than exceedances;
  - Development of comprehensive watershed management plans; and
  - Whether a surface water was previously on the 303(d) List for this pollutant, so that sampling could look for critical conditions when exceedances occur.

The TMDL statute precludes the placement of any surface water on the 2002 303(d) List that does not meet the requirements of the new Impaired Waters Rule. This has resulted in a number of surface waters, previously on the 1998 303(d) List being moved to the 2002 Planning List. These waters will also be prioritized for monitoring by either the ambient monitoring team, as part of the watershed rotation monitoring, or the targeted monitoring team.

Targeted surface waters with an overall ranking of high would be scheduled for monitoring in the two years following issuance of the 303(d) List. Medium or low priority waters would be addressed in the subsequent three years with the objective of having sufficient monitoring data on all waters on the Planning List within the current five-year watershed cycle. The current drought in Arizona may also delay obtaining sufficient data during critical conditions on some waters on the Planning List.

How Does ADEQ Assure Data Quality? – Data used in assessment and listing must be evaluated to determine whether it meets the credible data requirements of the newly adopted Impaired Waters Identification Rules (A.A.C. R18-11-602). To assure that the data is credible and relevant, all water quality data are collected using a suitable Quality Assurance Plan (QAP) and site-specific Sampling and Analysis Plan (SAP) or equivalent planning documents. Chemical and toxicological samples must be analyzed in a state-licensed laboratory, federal laboratory, or other laboratory that can demonstrate procedures that are substantially equal to those required by the Arizona Department of Health Services and use methods identified in A.A.C R9-14-610.

QAPs and SAPs

A **Quality Assurance Plan** details how environmental data collection and analyses are planned, implemented, and assessed for quality during the monitoring project.

A **Sampling and Analysis Plan** describes where, why, and how samples are to be collected to ensure that data quality objectives are met and that samples are spatially and temporally representative of surface water conditions.

Because surface water assessments are used to decide whether a surface water is impaired, these requirements apply to all data used in this assessment. These documents must specify the use of accepted field and laboratory methods by adequately trained staff. ADEQ has QAPs and associated SAPs for each of its monitoring programs that are available for reference by other monitoring entities.

Adequate training of field and laboratory personnel is essential. ADEQ, in conjunction with Arizona Department of Health Services, provides classes in field monitoring techniques. Several community colleges and universities also

offer classes in environmental sampling techniques.

The data are reviewed for accuracy and to determine whether all data points are valid. Questionable data is flagged and eliminated from the assessment process until it can be validated.

Some data was included in the monitoring tables in Volume II that did not meet the new credible data requirements. As noted in the tables, this data was not used for the final assessments, but they were included as reference information.

How Does ADEQ Track Monitoring Data? – Surface and ground water data is stored in ADEQ's Water Quality Database and uploaded to the federal STORET database. Data uploaded to the STORET database can be easily queried on the internet at: http://www.epa.gov/STORET ADEQ's Oracle based system is the repository of all water chemistry data collected by ADEQ and by other monitoring entities under contract by ADEQ. Eventually, all water quality data used in assessments will be stored in this database.

The groundwater portion of the database provides a comprehensive repository for well location information, well construction details, field measurement data (e.g., aquifer water levels), field observations (e.g., borehole geology), and water quality sampling results. The surface water portion stores sampling site information, field observations and measurements, and water quality sampling results. Further information concerning the Oracle database can be obtained by calling Wayne Hood, Data Management and Analysis Section Manager at (602) 771-4427.

Information about the data used for surface water assessments is provided in Volume II, the watershed section of this report. The agency monitoring, number of samples, years sampled, and constituents exceeding standards are summarized in these tables.

What happens after a surface water is assessed as "impaired?"

The federal Clean Water Act requires states and EPA to develop Total Maximum Daily Loads for any surface water identified as impaired. These water quality limited waters are placed on the federal 303(d) List.

A Total Maximum Daily Load Analysis (TMDL)

A TMDL is a written, quantitative plan and analysis to determine on a pollutant specific basis the maximum loading a surface water can assimilate and still attain and maintain a specific water quality standard during all conditions. The TMDL allocates the loading capacity of the surface water to point sources and nonpoint sources identified in the watershed, accounting for natural background and seasonal variation, with an allocation set aside as a margin of safety.

The purpose of a TMDL is to identify the sources and quantities of pollutants being delivered to a surface water, and to identify the maximum loading of a pollutant from each source which the surface water can assimilate and still meet a water quality standard. To make a TMDL more than just a modeling exercise, strategies must be identified and implemented that can effectively and economically meet the maximum loads identified and bring the surface water back into compliance with established water quality standards.

The development of a scientifically sound and publicly acceptable TMDL is complicated and resource intensive. It requires significant staff resources, funding for laboratory analyses of water quality samples, computer-based hydrologic modeling of watersheds, and a well coordinated and effective program to involve affected watershed stakeholders as well as other state and federal resource management agencies. Development of a TMDL can take from six months to several years depending on the size and hydrologic complexity of the watershed, severity of the impairment, behavior of the pollutant, number and distribution of pollutant sources within the watershed, and availability of water.

Since the current 303(d) List was approved in 1998, 21 TMDLs have been submitted to EPA for approval. The status of surface waters on Arizona's 1998 303(d) List is illustrated in **Figure 28**. More specific information is included in the assessment tables in Chapter V and summaries of the TMDLs are provided in the watershed reports in Volume II.

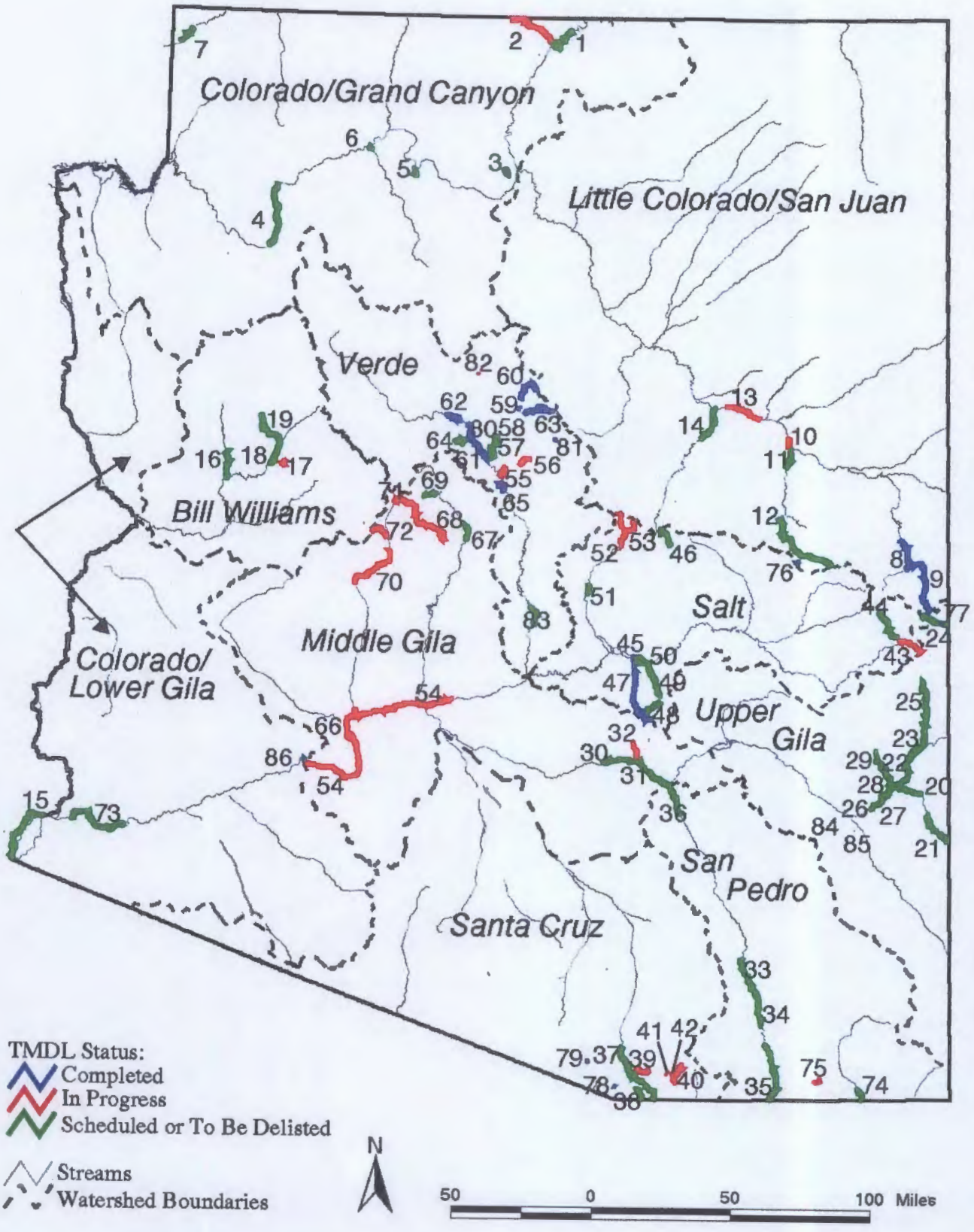


Figure 28. Status of TMDL Development – 2001

Status of TMDLs for Figure 28

Map #	TMDL	#	Waterbody	#	Waterbody
1	Colorado River selenium (S)	30	Gila River copper (S)	56	Wet Beaver Creek turbidity (P)
2	Paria River turbidity, beryllium (P)	31	Gila River turbidity (S)	57, 58	Oak Creek turbidity (2 reaches) (S)
3	Chuar Creek turbidity (S)	32	Mineral Creek metals (P)	59	Oak Creek bact (C)
4	Colorado River turbidity (S)	33	San Pedro River bact, turbidity, nitrate (S)	60	Oak Creek nutrients (C)
5	Royal Arch Creek selenium (S)	34	San Pedro River bact, turbidity (S)	61, 62, 65	Verde River turbidity (3 reaches) (C)
6	Havasu Creek turbidity (S)	35, 36	San Pedro River, turbidity (2 reaches) (S)	63	Munds Creek bact, nutrients (C)
7	Virgin River turbidity (S)	37	Santa Cruz River turbidity (3 reaches) (S)	64	Bitter Creek metals (S)
8	Little Colorado turbidity (2 reaches) (C)	38	Santa Cruz River cyanide (S)	66	Gila River boron (P)
9	Nutrioso Creek turbidity (2 reaches) (C)	39	Sonoita Creek dissolved oxygen (P)	67	Agua Fria River turbidity (S)
10, 13	Little Colorado metals (2 reaches) (P)	40	Harshaw Creek metals (P)	68	Turkey Creek metals (P)
11	Silver Creek turbidity (S)	41	Three R Canyon metals (P)	69	Galena Gulch metals (S)
12	Show Low Creek dissolved oxygen, turbidity (S)	42	Alum Wash metals (P)	70	Hassayampa River turbidity (P)
14	Chevelon Creek turbidity (S)	43	Beaver Creek nutrients, turbidity (P)	71	Hassayampa River metals (P)
15	Colorado River turbidity (S)	44	West Fork of Black Creek turbidity (S)	72	French Gulch metals (P)
16	Big Sandy River turbidity (S)	45	Salt River turbidity (S)	73	Gila River boron (S)
17	Boulder Creek metals (P)	46	Canyon Creek turbidity (P)	74	Whitewater Draw metals (S)
18	Burro Creek turbidity (S)	47	Pinto Creek copper (C)	75	Mule Gulch metals (P)
19	Francis Creek turbidity (S)	48	Bloody Tanks Wash copper (S)	76	Rainbow Lake nutrients (C)
20, 21	Gila River turbidity (2 reaches) (S)	49, 50	Pinal Creek metals (S)	77	Luna Lake nutrients (C)
22, 23	San Francisco River turbidity (2 reaches) (S)	51	Tonto Creek turbidity (S)	78	Pena Blanca lake mercury (C)
24	San Francisco River turbidity, bact (S)	52	Tonto Creek nutrients (P)	79	Arivaca Lake mercury (C)
25	Blue River turbidity (S)	53	Christopher nutrients (P)	80	Pecks Lake nutrients (C)
26, 27, 28	Gila River turbidity (3 reaches) (S)	54	Middle Gila pesticides (10 reaches and 2 lakes)(P)	81	Stoneman Lake nutrients (C)
29	Eagle Creek turbidity (S)	55	Beaver Creek dissolved oxygen, turbidity (P)	82	Whitehorse Lake nutrients (P)
				83	Bartlett Lake turbidity (S)

(C) = completed, (P) = in progress, (S) = scheduled or delisting based on investigation

The Proposed 2002 303(d) List – In accordance with Arizona Revised Statute (49-232.A), the proposed 303(d) List is submitted to EPA following public review and publication of the list and response to comments in the Arizona Administrative Register. The proposed 2002 303(d) List is included in Chapter V of this report along with a priority ranking and schedule for completing each TMDL on the list.

The TMDL statute provides any party that submits written comments on the draft list a process to challenge a surface water listing. Any challenged listing will not be included on the initial submission to EPA, but may be subsequently submitted if the listing is upheld in the director's final administrative decision.

Normally the 303(d) List is due to EPA on April 1st of each even-numbered year. However, EPA postponed the 2002 delivery data to October 1 for states willing to make an integrated assessment and listing report, such as this report. This consolidated report will be available at ADEQs web site in Adobe PDF format at: http://www.adeq.state.az.us/environ/water/assess/.

More Information --For more information regarding Arizona's TMDL Program, contact Nancy LaMascus, TMDL Unit Manager, at (602) 771-4468 or 1-800-234-5677 ext. 4468. Copies of the 1998 303(d) List and report are available by contacting the program and are also downloadable from the ADEQ web site in Adobe PDF format at: http://www.adeq.state.az.us/comm/download/water.html (scroll down to Hydrological Support and Assessment).

Cleaning up contaminated sites.

State and Federal Superfund Programs -- In conjunction with the EPA, ADEQ's Waste Programs Division is responsible for cleanup at most contaminated sites in Arizona. These sites are known to have contaminated soil and/or ground water, and in a few cases surface waters. Cleanup occurs under action of the following three programs:

- Federally funded Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also referred to as the federal Superfund Program;
- Arizona funded Water Quality Assurance Revolving Fund (WQARF), also referred to as the State Superfund Program; and
- Department of Defense (DOD) funded sites in the DOD Program.

Currently there are ten (10) federal Superfund sites known as National Priority List (NPL) sites, thirty-three (33) WQARF sites and twelve (12) DOD sites in Arizona (**Figure 29**). ADEQ provides oversight, local expertise, management, and technical assistance in cleaning up of all of these contaminated sites. As indicated in **Tables 30, 31, and 32,** these sites are contaminated by a variety of pollutants including: volatile organic compounds (e.g., solvents), metals, petroleum products, buried wastes, and buried ammunition, and other hazardous substances.

Additional sites are being considered for inclusion on the federal or state Superfund lists. To be added to the state WQARF registry, a site must be scored, owners and operators of the site must be notified, and the public must be provided with a 30-day comment period. To be added to the federal National Priority List a preliminary assessment and site investigation is conducted. If the site has a confirmed release to the environment considered to be a risk to public health or the environment according to the Hazard Ranking System, the site may be added to the National Priority List.

Table 30. Federal National Priority List (Superfund Sites)

Watershed	Map #	NPL Sites	Pollutants and Media Affected
CLG	1	Yuma Marine Corps Air Station	GW -- VOCs, petroleum hydrocarbons Soil -- asbestos containing material
MG	2	19th Avenue Landfill	GW -- VOCs (DCE), metals, beta-radiation Soil -- VOCs (ethyl benzene, 1,4-dichlorobenzene, xylenes, toluene)
MG	3	Hassayampa Landfill	GW -- VOCs Soil -- VOCs, metals, pesticides, lime waste
MG	4	Indian Bend Wash North	GW -- VOCs (TCE)
MG	4	Indian Bend Wash South	GW -- VOCs (TCE) Soil -- VOCs, cyanides, acids, chromium, lead
MG	5	Luke Air Force Base	Site delisted in 2002.
MG	6	Motorola 52nd Street	GW -- VOCs (TCE)
MG	7	Phoenix-Goodyear Airport South	GW -- VOCs (TCE), chromium Soil -- cadmium and chromium
MG	7	Phoenix - Goodyear Airport North	GW -- VOCs (TCE, perchlorates) Soils -- VOCs (TCE)
MG	8	Williams Air Force Base	GW and Soil -- Organic solvents, paint strippers, petroleum products, jet fuel, metals plating wastes, hydraulic fluids, pesticides, radiological wastes
SC	9	Tucson International Airport Area	GW -- VOCs (TCE, DCE) chloroform, chromium Soils -- Polychlorinated biphenyls
SC	9	162nd Air National Guard	GW and Soil -- VOCs (TCE)
SC	9	Raytheon Air Force Plant #44	GW and Soil -- Metals, VOCs
SP	10	Apache Powder	GW -- Arsenic, fluoride, nitrate, perchlorate SW -- Dinitroglycerine (DNT) Soil -- arsenic, barium, metals, nitrate, vanadium pentoxide, trinitroglycerine (TNT)

See table footnotes on page 11.

Table 31. Department of Defense (DOD) Sites

Watershed	Map #	DOD Sites	Pollutants and Media Affected
CLG	44	Barry M. Goldwater Range	Soil -- Waste, spent munitions, chlordane
CLG	45	Yuma Army Proving Grounds	GW and Soil -- Petroleum hydrocarbons, VOCs, SVOCs, metals
CGC	53	Kingman Airport	
MG	46	161st Air National Guard	GW and Soil -- Petroleum products, VOCs (benzene)
MG	47	Gila Bend Auxiliary Air Field - (Site Closed)	Soil -- Petroleum hydrocarbons
MG	48	Papago Military Reservation	GW and Soil -- Ammunition and explosives, lead, petroleum hydrocarbons
Salt	54	Waterdog Recreational Annex	GW and Soil -- Petroleum hydrocarbons
SC	49	Davis Monthan Air Force Base	Soil -- Petroleum waste, aluminum dross, jet fuel
SP	50	Fort Huachuca	GW and Soil -- Leaking Underground storage tanks and solid waste disposal
UG	55	Safford Military Range	Soil -- lead
VD, LCR	51	Camp Navajo	GW and Soil -- metals, VOCs, SVOCs, pesticides, constituents of explosives
VD, CLG	52	Naval Observatories (in Flagstaff & Sentinel)	

See table footnotes on page 11.

Table 32. WQARF Sites (State Superfund Sites)

Watershed	Map #	WQARF Site *	Pollutant(s) and Media Affected
CLG	11	20th Street and Factor Avenue	GW -- VOCs (PCE)
CLG	12	Tyson Wash	GW -- VOCs (PCE), nitrate
MG	13	16th Street and Camelback	GW -- VOCs - PCE
MG	14	Central and Camelback	GW -- VOCs (PCE), MTBE, BTEX
MG	15	East Central Phoenix -- 24th Street and Grand Canal	GW -- VOCs (PCE)
MG	16	East Central Phoenix -- 32nd Street and Indian School Road	GW -- VOCs (PCE)
MG	17	East Central Phoenix -- 38th Street and Indian School Road	GW -- VOCs (PCE)
MG	18	East Central Phoenix -- 40th Street and Indian School Road	GW -- VOCs (PCE)
MG	19	East Central Phoenix -- 40th Street and Osborn Road	GW -- VOCs (PCE)
MG	20	East Washington Fluff	Soil -- Lead, polychlorinated biphenyls (PCBs)
MG	21	East Central Phoenix -- 48th Street and Indian School Road	GW -- VOCs (PCE)
MG	22	Estes Landfill	GW -- VOCs (vinyl chloride, DCE, TCE, benzene, bis (2-ethylhexyl) phthalate); arsenic, barium, chromium, lead, manganese, and nitrate. Soil -- arsenic, lead, thallium
MG	33	7th Street and Arizona Avenue	GW -- VOCs (TCE, PCE, cis-1,2-DCE)
MG	23	South Mesa	GW -- VOCs (PCE)
MG	24	Vulture Mill	Soil -- Metals (lead)
MG	25	West Central Phoenix -- East Grand Avenue	GW and Soil -- VOCs (TCE, PCE, 1,1-DCE, 1,1-DCA, vinyl chloride)
MG	26	West Central Phoenix -- North Canal Plume	GW and Soil -- VOCs (TCE, PCE 1,1-DCE, 1,1-DCA, vinyl chloride)
MG	27	West Central Phoenix -- North Plume	GW and Soil -- VOCs (TCE, PCE, 1,1-DCE, 1,1-DCA, vinyl chloride)
MG	28	West Central Phoenix -- West Grand Ave.	GW and Soil -- VOCs (TCE, PCE, 1,1-DCE, 1,1-DCA, vinyl chloride)
MG	29	West Central Phoenix -- West Osborn Complex	GW and Soil -- VOCs (TCE, PCE, 1,1-DCE, 1,1-DCA, vinyl chloride)
MG	30	West Van Buren	GW -- VOCs (TCE, PCE)
MG	31	Western Ave. Plume	GW -- VOCs (PCE)
SC	32	Broadway-Pantano	GW -- VOCs (TCE, PCE, vinyl chloride)
SC	34	El Camino del Cerro	GW and Soil -- VOCs (TCE, PCE, vinyl chloride, benzene, methane)
SC	36	Los Reales Landfill	GW -- VOCs (TCE, PCE, Freon 11 and 12, chloroethane, DCE, methylene chloride, DCA)
SC	37	Miracle Mile	GW -- chromium, 7 VOCs including TCE
SC	38	Park-Euclid	GW -- VOCs (TCE, PCE, 1,2-DCE), diesel product
SC	41	Shannon Road - Rillito Creek	GW -- VOCs (TCE, PCE)
SC	42	Silverbell Jail Annex Landfill	GW -- VOCs (TCE, PCE, vinyl chloride, Freon 11 and 12, methylene chloride, cis-1,2-dichloroethene)
SP	35	Klondyke Tailings	GW, SW, and Soil -- Metals
SR	40	Pinal Creek	GW, SW, and Soil: Metals, fluoride, sulfate, sulfuric acid
VD	39	Payson PCE	GW -- VOCs (PCE)
VD	43	Tonto and Cherry	GW -- VOCs (PCE)

* GW = ground water contamination, SW = surface water contamination
* VOC = volatile organic chemical, SVOC = semi-volatile organic chemical, TCE = trichloroethene, PCE = tetrachloroethane, DCE = dichloroethene,
DCA = dichloroethane, DCB = dichlorobenzene, MTBE = methyl tertiary butyl ether, BTEX = combination of petroleum hydrocarbons (benzene, toluene, ethylbenzene, xylene)

Watersheds: BW = Bill Williams, CLG = Colorado Lower Gila, LCR = Little Colorado-San Juan, MG = Middle Gila, Salt, SC = Santa Cruz-Rio Magdelena-Rio Sonoyta, SP = San Pedro-Willcox Playa-Rio Yaqui, UG = Upper Gila,
VD = Verde

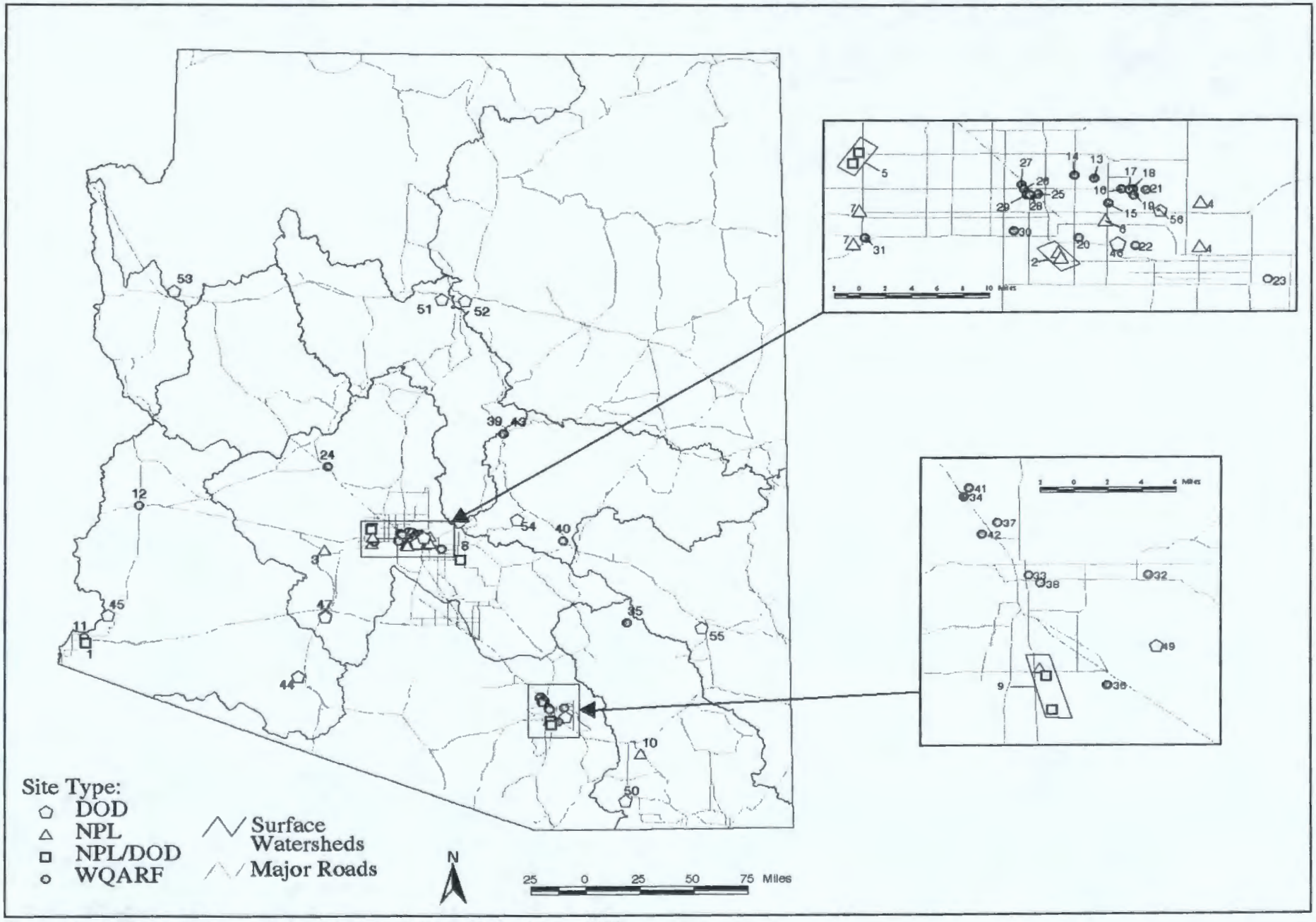


Figure 29. Arizona's State and Federal Superfund Remediation Sites – 2002

Underground Storage Tanks -- The majority of underground storage tanks in Arizona contain petroleum compounds, such as gasoline and diesel fuels. ADEQ has programs are to prevent, detect, and clean up releases that contaminate soil and water, and through the State Assurance Fund, provides financial assistance to help pay clean up costs. Since ADEQ's Underground Storage Tank Program began in 1987, 7,838 underground storage tank leaks have been reported. As of 2001, 5,273 cleanups have been documented. Of the remaining sites, only 1,133 have or may have contaminated ground water.

As of June 2001, ADEQ was tracking approximately 9,360 facilities with 27,500 associated underground storage tanks. However, of the 9,360 facilities only 2,950 have active tanks (19,360 of the 27,500 registered tanks are inactive). Further information about this program can be obtained at ADEQ's web site: http://www.adeq.state.az.us or by calling (602) 771-4322.

RCRA Hazardous Waste Contamination Sites -- The enactment of the federal Resource Conservation and Recovery Act (RCRA) in 1976 created a federal regulatory program for managing hazardous waste handlers in order to protect human health and the environment. This program was delegated to Arizona with EPA oversight through the Arizona Hazardous Waste Management Act of 1980. Handlers include generators, transporters, and facilities for treatment, storage, and disposal.

RCRA is coordinated with CERCLA (the federal Superfund Program) to regulate handlers and oversee the clean up of contaminated sites. Releases from improper generation, transportation, and disposal activities have lead to significant contamination of surface and ground water, soil, and even air in Arizona **(Table 33 and Figure 30).**

Table 33. RCRA Remediation Sites

Map #	Site Name	Media	Watershed
1	Automotive Parts Exchange Plant 1, Yuma	Soil	CLG
2	McCulloch Corporation, Lake Havasu City	Soil, GW	CLG
3	Snavely Lease, Santa Claus	Soil	CLG
4	US Army Yuma Proving Ground, Yuma	Soil (referred to Superfund)	CLG
5	Fagan Lake	Soil	
6	ABM Industries/ Rose Pesticide Control, Phoenix	Soil	MG
7	Allied Signal, Phoenix	Soil	MG
8	Baldwin Metals, Arlington	Soil	MG
9	Chem Research Company Inc., Phoenix	Soil, GW	MG
10	Colbe Mining Claim on BLM land, near Apache Junction	Soil	MG
11	Collins Metal Finishing Inc., Phoenix	Soil	MG
12	Dolphin Inc., Phoenix	Soil, GW	MG
13	Felton King Company, Phoenix	Soil	MG
14	German Motor Car Restoration/Phoenix Engine Rebuilders, Phoenix	Soil	MG
15	Kinder Morgan (Sante Fe Pacific Pipeline), Liberty	Soil, GW	MG
16	Luke Air Force Base Barry Goldwater Range, Gila Bend	Soil	MG
17	Marsh Aviation, Co., Mesa	Soil	MG
18	Papago Plating Company, Inc., Phoenix	Soil	MG
19	Phoenix Heat Treating, Phoenix	Soil	MG
20	Prestige Cleaners at Camelback, Scottsdale	Soil	MG
21	Puregro Company, Tolleson	Soil, GW	MG
22	Revlon, Phoenix	Soil, GW	MG
23	Roosevelt Recreation Vehicle Park and Motel, Roosevelt	Soil	MG
24	Safety Kleen, Phoenix	Soil	MG
25	Salt River Steel, Phoenix	Soil	MG

Map #	Site Name	Media	Watershed
26	Sunbelt Trucking, Apache Junction	Soil	MG
27	Superior Carburetor, Phoenix	Soil	MG
28	Talley Industries, Mesa	Soil	MG
29	TRW Site II, Mesa	Soil	MG
30	Unichem, Gilbert	Soil, GW	MG
31	Walbar, Tempe	GW	MG
32	Winterberg RD Airstrip, Tonopah	Soil	MG
33	Arizona Pacific Wood Preserving, Eloy	Soil	SC
34	DMI Aviation, Tucson	Soil	SC
35	Evergreen Air Center, Pinal Air Park, Marana	Soil	SC
36	Griffin Corporation/Kocide, Casa Grande	Soil, GW	SC
37	Mission Linen, Tucson	Soil	SC
38	National Aircraft Inc., Tucson	Soil	SC
39	Taylor Airfield, Marana	Soil	SC
40	United Musical Instruments (TSD), Nogales	GW	SC
41	Fort Huachuca US Air Guard, Huachuca	Soil	SP
42	B & B Materials, Rimrock	Soil	VD
43	US Army National Guard, Camp Navajo, Bellmont	Soil	VD
44	Walmart #1299, Cottonwood	Soil	VD

GW = Ground water, SW = Surface Water
CLG = Colorado Lower Gila, MG = Middle Gila, SC = Santa Cruz-Rio Magdalen-Rio Sonoyta, SP = San Pedro-Willcox Playa-Rio Yaqui, VD = Verde

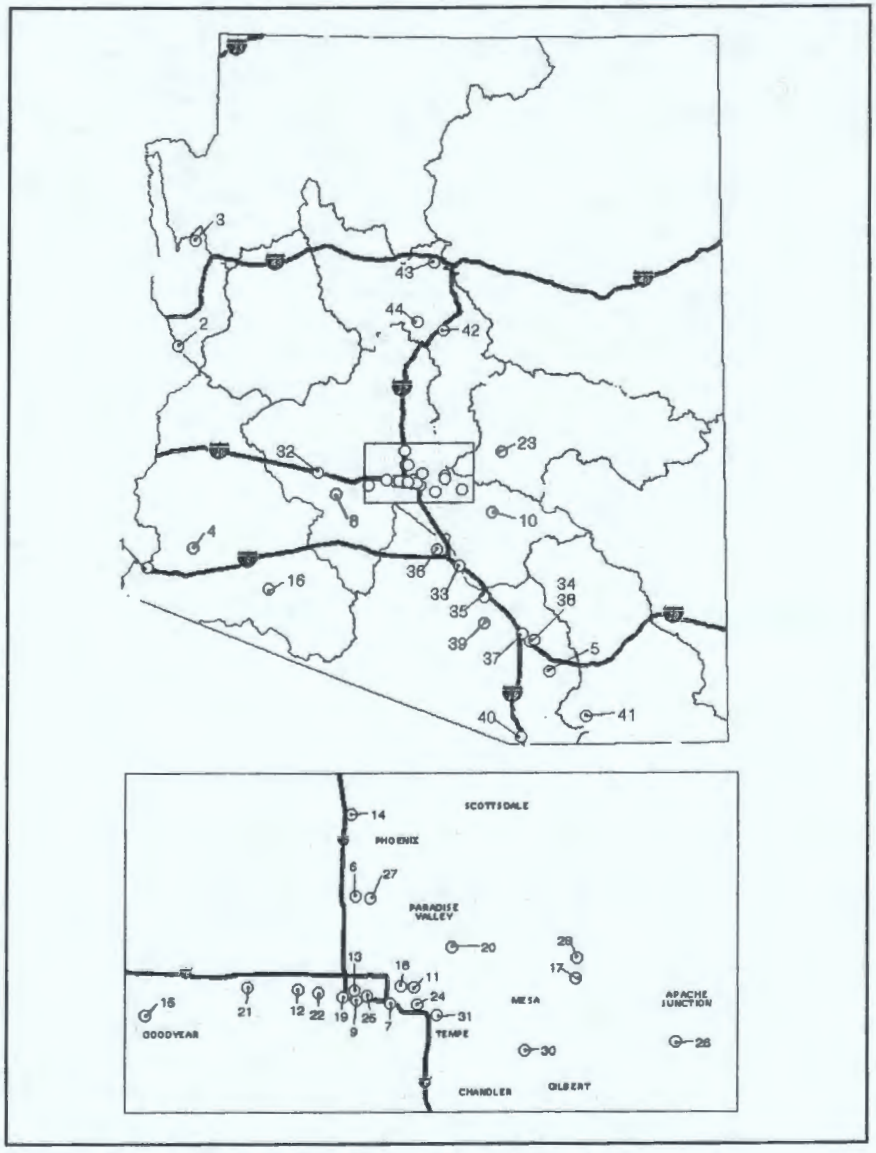


Figure 30. RCRA Remediation Sites in Arizona

How is Arizona working with Mexico to improve water quality?

Unreliable water supply and water pollution are persistent environmental and public health problems in the United States and Mexico border region. Insufficient wastewater treatment, disposal of untreated discharges, and inadequate operation and maintenance of treatment plants endanger the health of the border communities. Moreover, the lack of suitable catchments, treatment, and distribution systems for potable water are serious public health issue.

US and Mexico Border XXI Program -- The Border Project area, illustrated in **Figure 31**, extends 60 miles north and south of the Mexico - Arizona border. Binational water infrastructure projects for potable water and sanitation have been undertaken pursuant to the 1944 International Boundary and Waters Treaty. Many federal, state and local institutions and agencies participate in these border area efforts. Specifically, the International Boundary and Water Commission (IBWC), the National Water Commission (CNA) [Mexico], USEPA, the Border Environment Cooperation Commission (BECC) and the NADBank have been collaborating on the planning, financing, and implementation of these projects. Efforts have been coordinated through the United States and Mexico Border XXI Program. This five-year program, ended in October 2001, will be continued by both countries for the coming years. Binational meetings are taking place to shape the future of this program. Arizona is intensively participating in this planning process.

One goal of the Border XXI Program is to put in place or replace inadequate infrastructure so that treated wastewater effluent from municipal and industrial sources will not degrade the surface water receiving the effluent. To demonstrate the effectiveness of these projects, baseline conditions of the surface water receiving effluent flows were established to determine the future impact of effluent once the project is in place.

The effects of these international cooperative projects on improvements in water quality are currently unknown since most are in the planning or construction stage. However, work is underway to characterize surface waters in the border region and to monitor water quality so that it will be possible to determine whether an implemented project has achieved its stated objectives, and to be able to improve or change the project to further improve water quality.

Working in the border region is complicated by overlapping functions in the many agencies and institutions involved in the process along with national differences in relevant legislation. Increased communication, cooperation, and coordination are essential to the success of this process.

Nogales International Wastewater Treatment Plant -- The Nogales Wastewater Treatment Plant provides wastewater treatment for the cities of Nogales, Arizona and Nogales, Sonora. This plant, which was issued a new NPDES permit in 2001 from EPA, is being expanded to accommodate increase sewage flows from both cities. The plant has also applied for an Aquifer Protection Permit from ADEQ.

A newly expanded plant is expected to be in operation in 2004. The NPDES permit requires the implementation of an industrial wastewater pretreatment program for both cities. Nogales, Arizona already has a pretreatment program in place, and ADEQ will be supporting the state of Sonora in the implementation of pretreatment activities for the city of Nogales, Sonora under a Memorandum of Understanding that was signed in June 2001 between both states.

Douglas Wastewater Treatment Plant -- The City of Douglas, Arizona is securing an Aquifer Protection Permit from ADEQ for its wastewater treatment operation. This plant does not need an NPDES permit since the treated effluent is being discharged directly into Mexico for reuse purposes. Negotiations are underway to secure an Aquifer Protection Program Permit and select the level of wastewater treatment for this plant although Class C effluent is being considered at Mexico's request. The proposed use for this effluent by Mexico would be as a coolant for power plant operations in Agua Prieta, Sonora where additional treatment would be required.

Power Plants and Effluent -- The shortage of energy in the western region has originated the planning and construction of power plants on both sides of the border. A projected 500-megawatt plant in Nogales, Arizona (to export energy to Mexico), a phased 1275 megawatt plant in Agua Prieta Sonora, a 2000-MW plant in San Luis RC, Sonora, and a 600 megawatt plant in Yuma, Arizona are being considered. Treated effluent from wastewater treatment plants located in the border region is being considered for power plant cooling systems. Active negotiations on the sale of trans-boundary treated effluent (quantity and quality) are taking place for some of these power plants projects.

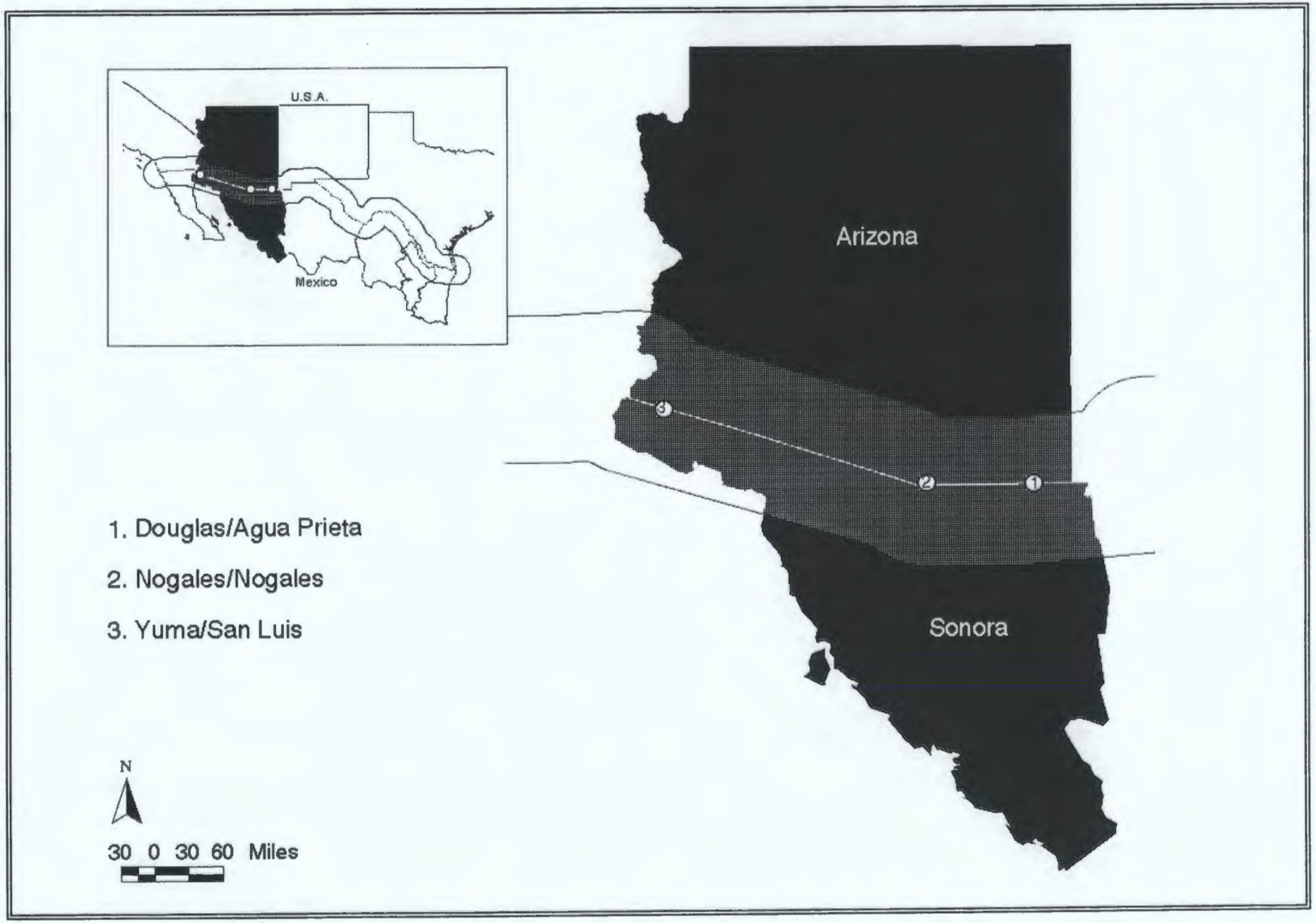


Figure 31. Arizona's United States-Mexico Border Project Area

Water Quality Monitoring Projects in Arizona's Borderlands – ADEQ and the University of Sonora (UNISON) signed a Memorandum of Understanding in June 2001 to perform water quality sampling activities in the trans-boundary portions of binational watersheds of the Sonora border region. In Arizona, these binational surface water basins include: San Pedro, Rio Yaqui, Santa Cruz, Rio Magdalena and Lower Colorado River. These water quality projects will support border activities such as the development of the surface and ground water quality indicators for the border region. This agreement also provides technology-transfer opportunities where the Arizona Department Health Services State Laboratory can provide guidance in developing UNISON's analytical capabilities.

Several monitoring studies have occurred in the trans-boundary region in the recent past including the following studies:

- **Lower Colorado River Study** -- In 1994, sites throughout the lower Colorado River basin were sampled and analyzed to determine concentrations of chemical pollutants and effects on aquatic organisms. A final report summarizing the results by the IBWC was not released until October 2001.

- **Aqua Prieta, Cananea, and Naco water studies** -- Water quality for the municipalities of Agua Prieta, Cananea, and Naco Sonora, Mexico was studied from 1996 through 1998. Results have indicated exceedances of the Mexican Water Quality Criteria for heavy metals (cadmium, chromium, copper, iron, manganese, nickel, lead and zinc), nitrates, sulfates, and fluorides in the mining and municipal discharges leading to the headwaters of the San Pedro River. The study did not find any exceedance of these parameters in the San Pedro River sampling points located near the international border. These monitoring studies also detected trichloroethene (a volatile organic chemical) in a public supply well located in Agua Prieta very close to the international border. Additional monitoring is being planned for this area with a grant from the USEPA to the local non-governmental organizations (with ADEQ support) to locate the possible sources of TCE in the area.

- **Santa Cruz River studies** -- Two studies have been performed to evaluate water quality in the Santa Cruz River. The US Fish and Wildlife Service has completed a toxicity study of ambient water above and below the Nogales International Wastewater Treatment Plant discharge (King et al., 1999). A volunteer organization, known as the Friends of the Santa Cruz River, also completed a water quality study (ADEQ, 1995) and has continued to monitor the upper Santa Cruz and its tributaries.

- **Nogales Wash Study** -- A binational study of ground water quality along the alluvial aquifer of Nogales Wash was initiated in 1996. Monitoring wells have been placed on both sides of the border and soil and ground water samples have been collected. Interpretation of the data indicates that ground water exceeded both Arizona and Mexico water quality standards for nitrate and fecal coliform. An organic solvent, tetrachlorotethylene (PCE), was also detected in concentrations exceeding Mexico's standards in Sonora but below Arizona's standards in Arizona. The contaminant distribution suggested the existence of a PCE plume in Sonora. In addition, arsenic levels detected in Arizona monitoring wells exceeded the Arizona Aquifer Water Quality Standards. (Arsenic contamination was detected in monitoring wells, not in drinking water wells.). Additional soil gas survey activities were performed at selected sites in November 2000 by the EPA Superfund Program in conjunction with ADEQ and the Mexican agencies on both sides of the border. These efforts attempted to locate potential sources of PCE contamination. Low levels of PCE were found at sites located in Nogales, Sonora. In addition, public drinking water supply wells and other wells were sampled in Nogales, Arizona in November 2000 and in June 2001 under the EPA Superfund Program. Preliminary data indicates still low levels of PCE contamination persists in monitoring wells.

Appendix A. Acronyms, Abbreviations, Definitions, and Units of Measure

AAC	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
AGFD	Arizona Game and Fish Department
Agricultural Irrigation (AgI)	Surface water is used for the irrigation of crops.
Agricultural Livestock Watering (AgL)	Surface water is used as a supply of water for consumption by livestock.
Active Management Area (AMA)	A ground water quantity management area, established under the Groundwater Management Code, established where ground water overdraft is most severe. There are five AMA's: Phoenix, Pinal, Prescott, Santa Cruz, and Tucson.
Aquatic and Wildlife Coldwater Fishery (A&Wc)	Surface water is used by animals, plants, or other organisms, including salmonids, for habitation, growth, or propagation.
Aquatic and Wildlife Effluent Dependent Water (A&Wedw)	Effluent dependent water is used by animals, plants, or other organisms for habitation, growth, or propagation.
Aquatic and Wildlife Ephemeral (A&We)	Ephemeral water is used by animals, plants, or other organisms, excluding fish, for habitation, growth, or propagation.
Aquatic and Wildlife Warmwater Fishery (A&Ww)	Surface water is used by animals, plants, or other organisms, excluding salmonids, for habitation, growth, or propagation.
Aquatic Biotic Tissue	Fish tissue or other aquatic organism tissue; criteria are from US Fish and Wildlife Service published action levels.
BEHI	Bank erosion hazard index.
Biological Communities	Groups of fish, macroinvertebrates, algae, or riparian vegetation occupying a habitat or area.
BLM	United States Bureau of Land Management
BoR	United States Bureau of Reclamation
CAP	The Central Arizona Project is a canal system that brings Colorado River water across Arizona, terminating in Tucson.
CERCLA	Comprehensive Environmental Response Compensation and Liability Act. EPA's Superfund Program.
Core Parametric Coverage	Although all parameters with numeric standards are used for assessments, there needs to be at least three sampling events with these specified parameters to assess a designated use as "attaining." This specified parametric coverage does not need to be available to assess a designated use as "impaired."
Credible Data	Surface water monitoring data that is collected meeting requirements established in the Impaired Waters Rule (R18-11-602). These requirements include collecting and analyzing data using a Quality Assurance Plan, Sampling and Analysis Plan, approved methods, approved laboratory, and adequately trained personnel.

Designated Uses	Designated uses are specified for stream segments and lakes in the surface water rules (Arizona Administrative Code R18-11-104). Waterbodies not listed in the rules obtain their designated uses through the "Tributary Rule". Arizona's surface water designated uses include: **Aquatic and Wildlife** **Coldwater Fishery** (A&Wc) **Warmwater Fishery** (A&Ww) **Ephemeral Stream** (A&We) **Effluent Dependent Water** (A&Wedw), **Domestic Water Source** (DWS), **Fish Consumption** (FC), **Full Body Contact** (FBC) (i.e., swimming), **Partial Body Contact** (PBC) (i.e., non-swimming recreation), **Agricultural Irrigation** (AgI), and **Agricultural Livestock Watering** (AgL).
Designated Use Support	**Attaining** – Surface water quality standards are being met based on a minimum of 3 monitoring events that provide seasonal representation and core parametric coverage. **Threatened** – Surface water quality standards are currently being met, but a trend analysis indicates that the surface water is likely to be impaired before the next assessment. **Impaired** – Surface water quality standards are not being met based on sufficient number of samples to meet the test of impairment identified in the Impaired Waters Identification Rule **(Appendix B)**. **Not attaining** – Surface water is not attaining its uses, but a TMDL does not need to be completed because: 1) A TMDL has been approved and being implemented, 2) Another action is occurring that so that the surface water is expected to attain its uses before the next assessment, or 3) The impairment is due to pollution where a pollutant loading cannot be calculated (e.g., hydromodification). **Inconclusive** – Monitoring or other assessment information available is insufficient to assess the surface water as "attaining," "threatened," "impaired," or "not attaining." **Not assessed** – Only one water sample or no samples. No information indicating that a narrative standard may be violated.
Domestic Water Source (DWS)	Surface water is used as a potable water supply. Coagulation, sedimentation, filtration, disinfection or other treatments may be necessary to yield a finished water suitable for human consumption.
Effluent Dependent Water	A surface water that consists primarily of discharges of treated wastewater which has been classified as an effluent dependent water under Arizona Administrative Code R18-11-113.
EMAP	US Environmental Protection Agency's Environmental Monitoring and Assessment Project.
EPA or USEPA	The U.S. Environmental Protection Agency
Ephemeral Flow	Surface water that has a channel that is at all times above the water table, that flows only in direct response to precipitation, and that does not support a self-sustaining fish population (Arizona Administrative Code R18-11-101). (See also "intermittent flow" and "perennial flow.")
Exceed/Exceedance	Monitoring data results were greater than a maximum standard or below a minimum standard.
Fish Consumption (FC)	Surface water is used by humans for harvesting aquatic organisms for consumption. Harvestable aquatic organisms include, but are not limited to, fish, clams, crayfish, and frogs.
Full Body Contact (FBC)	Surface water use causes the human body to come into direct contact with the water to the point of complete submergence (e.g., swimming). The use is such that ingestion of the water is likely to occur and certain sensitive body organs (e.g., eyes, ears, or nose) may be exposed to direct contact with the water.

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IBWC	International Boundary and Water Commission, an international commission established to resolve water quality issues along the United States border with Mexico.
Intermittent Flow	Surface water flows only at certain times of the year when receiving water from springs or from some surface source such as melting snow in mountainous areas (i.e., seasonal). (See also "ephemeral flow" and "perennial flow.")
Macroinvertebrates	Stream bottom dwelling insects and other organisms that inhabit freshwater habitats for at least part of their life cycle and are retained by a mesh screen size greater than 0.2 millimeters.
MCL	Maximum Contaminant Level. Standards for public drinking water systems. (See also SMCL.)
Narrative Water Quality Standards	(R18-11-108) Surface waters will be free from pollutants in amounts or combinations that: - Settle to form bottom deposits that impair aquatic life or recreational uses; - Cause an objectionable odor; - Cause an off-taste or odor in drinking water; - Cause an off-flavor in aquatic organisms or waterfowl; - Are "toxic" to humans, animals, plants, or other organisms; - Cause the growth of algae or aquatic plants that impair aquatic life or recreational uses; - Cause or contribute to a violation of an aquifer water quality standard (R18-11-405 through 406; or - Change the color of the surface water from natural background levels.
Naturally Occurring Condition	The condition of a surface water or segment that would have occurred in the absence of pollutant loadings as a result of human activity.
NAWQA	The US Geological Survey's National Water Quality Assessment Program.
Nonpoint Source	These sources of pollutants come from nondiscrete discharges such as atmospheric deposition, contaminated sediment, and land uses that generate polluted runoff like agriculture, urban land development, forestry, construction, and on-site sewage disposal systems. Nonpoint source pollution also encompasses activities that either change the natural flow regime of a stream or wetland or result in habitat disturbance.
NPDES / AZPDES	National Pollutant Discharge Elimination System is a federal point source discharge permit. ADEQ is to obtain primacy for this program, which will use the acronym AZPDES in describing this permit.
Partial Body Contact (PBC)	Surface water is used so that the human body to come into direct contact with the water, but normally not at the point of complete submergence (i.e., non-swimming recreation). The use is such that ingestion of the water is not likely to occur, nor will sensitive body organs (e.g., eyes, ears, or nose) normally be exposed to direct contact with the water.
Perennial Flow	Surface water that flows continuously. (See also "ephemeral flow" and "intermittent flow.")

Point Source	These sources of pollution are discrete, identifiable sources such as pipes or ditches that are primarily associated with industries and municipal sewage treatment plants. (See nonpoint source.)
Public Water Supply	A water system which conveys water for human consumption to 15 or more service connections or serves an average of at least 25 persons per day (as defined by the federal Safe Drinking Water Act).
QAP	Quality Assurance Plan. This is a written plan detailing how environmental data will be collected, analyzed, assessed for quality, and establishes the data quality objectives that the data must meet.
RCRA	Resource Conservation and Recovery Act established by the federal government to control hazardous wastes.
Reach	A segment of a stream. EPA originally divided Arizona's streams on the USGS hydrology at 1:100,000 scale map into reaches based on hydrological features such as tributaries. ADEQ has further subdivided these reaches based on changes in designated use support and water quality.
Sampling Event	A "sampling event" is one or more samples taken under consistent conditions on one or more consecutive days at a specific location.
SAP	Sampling and Analysis Plan. This is a written site-specific plan to ensure that samples collected and analyzed meet data quality objectives and are representative of surface water conditions at the time of sampling.
SMCL	Secondary Maximum Contaminant Level. A guidance level established by EPA for substances that create only taste or odor problems in drinking water.
SRP	Salt River Project
Surface Water	These are "waters of the United States", which include: - All waters which are, have been, or could be used for interstate or foreign commerce; - All interstate waters or wetlands; - All lakes, reservoirs, natural ponds, rivers, streams (including intermittent and ephemeral streams), creeks, washes, draws, mudflats, sandflats, wetlands, backwaters, playas (etc.) which could be used by visitors to our state for recreation, from which fish or shellfish could be taken or sold, or which is used for industrial purposes; or - All impoundments, wetlands, or tributaries of above waters. (Summarized from Arizona Administrative Code R18-11-101)
SVOC	Semi-volatile organic chemical or compound (see also VOC)
Toxic Chemicals	Pollutants or combinations of pollutants which, after discharge and exposure (contact, ingestion, inhalation, or assimilation) to any organism (either directly from the environment or indirectly through the food chain), may cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformations in such organisms or offspring.
TMDL	Total Maximum Daily Load. A TMDL is a written, quantitative plan and analysis to determine the maximum loading on a pollutant basis that a surface water can assimilate and still attain and maintain a specific water quality standard during all conditions. The TMDL allocates the loading capacity of the surface water to point sources and nonpoint sources identified in the watershed, accounting for natural background levels and seasonal variation, with an allocation set aside as a margin of safety.

Trophic Status	Lakes can be classified by the level of nutrients available for primary biological production. Lakes generally progress through the following trophic phases or states: **Oligotrophic** -- Low algal or plant productivity; **Mesotrophic** -- Medium algal or plant productivity; **Eutrophic** -- High algal or plant productivity; and productivity; **Hypereutrophic** -- Very high algal or plant productivity and light limited. That is, instead of growth being limited by nutrient availability (as it is in other trophic conditions), growth becomes limited by light.
Unique Water	A surface water classified as an outstanding state resource water under Arizona Administrative Code R18-11-112.
USFWS	United States Fish and Wildlife Service
USFS	United States Forest Service
USGS	United States Geological Survey
UST	Underground Storage Tanks Program for eliminating the release of toxic chemicals from storage tanks.
VOC	Volatile organic chemical or compound (e.g., solvents)
Waters of the United States	(See "surface water" definition.)
WTP	Water Treatment Plant for drinking water treatment.
WWTP	Wastewater Treatment Plant
WQARF	Water Quality Assurance Revolving Fund. Arizona's Superfund program for cleanup of contaminated sites.

CHEMICAL ABBREVIATIONS

BTEX	combination of petroleum hydrocarbons including: benzene, toluene, ethylbenzene, xylene
DCA	dichloroethane
DCB	dichlorobenzene
DCE	dichloroethene
MTBE	methyl tertiary butyl ether
PCE	tetrachloroethane
TCE	trichloroethene

UNITS OF MEASUREMENT AND CONVERSIONS

MEASUREMENT USE	UNIT	EQUIVALENT UNITS OR CONVERSION
Bacteria concentration in water	colony forming units (CFS) per 100 milliliter	
Chemical concentrations in water	milligram per liter (mg/L) microgram per liter (µg/L)	1 mg/L = 0.001 grams per liter 1 mg/L = parts per million (ppm) 1 µg/L = 0.001 milligram per liter (mg/l) 1 µg/L = 0.000001 grams per liter 1 µg/L = 1 parts per billion (ppb)
Chemical concentrations in animal tissue and sediment	milligram per kilogram (mg/kg) microgram per kilogram (µg/kg)	1 mg/kg = 1 parts per million (ppm) 1 mg/kg = 1 microgram per gram (µg/g) 1 µg/kg = 1 parts per billion (ppb)
Ground water quantity	acre-feet	1 acre-foot = 325,900 gallons
pH in water	standard unit (SU)	
Radiochemical concentrations in water	picocuries per liter (pCi/L)	
Rate of flow	cubic feet per second (cfs)	1 cfs = 448.83 gallons per minute (gpm) 1 cfs = 646,000 gallons per day (gpd)
Lake area	acres	
Stream length	miles	1 mile = 1.6 kilometers (km)
Watershed size	square miles	1 square mile = 640 acres per square mile
Water turbidity (ability to light to travel through the water)	Nephelometric Turbidity Unit (NTU)	

Appendix B. Arizona's Statute and Rules for Impaired Waters

ARIZONA'S REVISED STATUTES
ARTICLE 2.1 TOTAL MAXIMUM DAILY LOADS
49-231 TO 49-238 (effective July 2000)

49-231. Definitions

In this article, unless the context otherwise requires:

1. "Impaired water" means a navigable water for which credible scientific data exists that satisfies the requirements of section 49-232 and that demonstrates that the water should be identified pursuant to 33 United States Code section 1313(d) and the regulations implementing that statute.
2. "Surface water quality standard" means a standard adopted for a navigable water pursuant to sections 49-221 and 49-222 and section 303(c) of the clean water act (33 United States Code section 1313(c)).
3. "TMDL implementation plan" means a written strategy to implement a total maximum daily load that is developed for an impaired water. TMDL implementation plans may rely on any combination of the following components that the department determines will result in achieving and maintaining compliance with applicable surface water quality standards in the most cost-effective and equitable manner:
(a) Permit limitations.
(b) Best management practices.
(c) Education and outreach efforts.
(d) Technical assistance.
(e) Cooperative agreements, voluntary measures and incentive-based programs.
(f) Load reductions resulting from other legally required programs or activities.
(g) Land management programs.
(h) Pollution prevention planning, waste minimization or pollutant trading agreements.
(i) Other measures deemed appropriate by the department.
4. "Total maximum daily load" means an estimation of the total amount of a pollutant from all sources that may be added to a water while still allowing the water to achieve and maintain applicable surface water quality standards. Each total maximum daily load shall include allocations for sources that contribute the pollutant to the water, as required by section 303(d) of the clean water act (33 United States Code section 1313(d)) and regulations implementing that statute to achieve applicable surface water quality standards.

49-232. Lists of impaired waters; data requirements; rules

A. At least once every five years, the department shall prepare a list of impaired waters for the purpose of complying with section 303(d) of the clean water act (33 United States Code section 1313(d)). The department shall provide public notice and allow for comment on a draft list of impaired waters prior to its submission to the united states environmental protection agency. The department shall prepare written responses to comments received on the draft list. The department shall publish the list of impaired waters that it plans to submit initially to the regional administrator and a summary of the responses to comments on the draft list in the Arizona administrative register at least forty-five days before submission of the list to the regional administrator. Publication of the list in the Arizona administrative register is an appealable agency action pursuant to title 41, chapter 6, article 10 that may be appealed by any party that submitted written comments on the draft list. If the department receives a notice of appeal of a listing pursuant to section 41-1092, subsection B within forty-five days of the publication of the list in the Arizona administrative register, the department shall not include the challenged listing in its initial submission to the regional administrator. The department may subsequently submit the challenged listing to the regional administrator if the listing is upheld in the director's final administrative decision pursuant to section 41-1092.08, or if the challenge to the listing is withdrawn prior to a final administrative decision.

B. In determining whether a water is impaired, the department shall consider only reasonably current credible and scientifically defensible data that the department has collected or has received from another source. Results of water sampling or other assessments of water quality, including physical or biological health, shall be considered credible and scientifically defensible data only if the department has determined all of the following:
1. Appropriate quality assurance and quality control procedures were followed and documented in collecting and analyzing the data.
2. The samples or analyses are representative of water quality conditions at the time the data was collected.
3. The data consists of an adequate number of samples based on the nature of the water in question and the parameters being analyzed.
4. The method of sampling and analysis, including analytical, statistical and modeling methods, is generally accepted and validated in the scientific community as appropriate for use in assessing the condition of the water.

C. The department shall adopt by rule the methodology to be used in identifying waters as impaired. The rules shall specify all of the following:
1. Minimum data requirements and quality assurance and quality control requirements that are consistent with subsection B of this section and that must be satisfied in order for the data to serve as the basis for listing and delisting decisions.
2. Appropriate sampling, analytical and scientific techniques that may be used in assessing whether a water is impaired.
3. Any statistical or modeling techniques that the department uses to assess or interpret data.
4. Criteria for including and removing waters from the list of impaired waters, including any implementation procedures developed pursuant to subsection F of this section. The criteria for removing a water from the list of impaired waters shall not be any more stringent than the criteria for adding a water to that list.

D. In assessing whether a water is impaired, the department shall consider the data available in light of the nature of the water in question, including whether the water is an ephemeral water. A water in which pollutant loadings from naturally occurring conditions alone are sufficient to cause a violation of applicable surface water quality standards shall not be listed as impaired.

E. If the department has adopted a numeric surface water quality standard for a pollutant and that standard is not being exceeded in a water, the department shall not list the water as impaired based on a conclusion that the pollutant causes a violation of a narrative or biological standard unless:
1. The department has determined that the numeric standard is insufficient to protect water quality.
2. The department has identified specific reasons that are appropriate for the water in question, that are based on generally accepted scientific principles and that support the department's determination.

F. Before listing a navigable water as impaired based on a violation of a narrative or biological surface water quality standard and after providing an opportunity for public notice and comment, the department shall adopt implementation procedures that specifically identify the objective basis for determining that a violation of the narrative or biological criterion exists. A total maximum daily load designed to achieve compliance with a narrative or biological surface water quality standard shall not be adopted until the implementation procedure for the narrative or biological surface water quality standard has been adopted.

G. On request, the department shall make available to the public data used to support the listing of a water as impaired and may charge a reasonable fee to persons requesting the data.

H. By January 1, 2002, the department shall review the list of waters identified as impaired as of January 1, 2000 to determine whether the data that supports the listing of those waters complies with this section. If the data that supports a listing does not comply with this section, the listed water shall not be included on future lists submitted to the United States environmental protection agency pursuant to 33 United States Code section 1313(d) unless in the interim data that satisfies the requirements of this section has been collected or received by the department.

I. The department shall add a water to or remove a water from the list using the process described in section 49-232, subsection A outside of the normal listing cycle if it collects or receives credible and scientifically defensible data that satisfies the requirements of this section and that demonstrates that the current quality of the water is such that it should be removed from or added to the list. A listed water may no longer warrant classification as impaired or an unlisted water may be identified as impaired if the applicable surface water quality standards, implementation procedures or designated uses have changed or if there is a change in water quality.

49-233. <u>Priority ranking and schedule</u>

A. Each list developed by the department pursuant to section 49-232 shall contain a priority ranking of navigable waters identified as impaired and for which total maximum daily loads are required pursuant to section 49-234 and a schedule for the development of all required total maximum daily loads.

B. In the first list submitted to the United States environmental protection agency after the effective date of this article, the schedule shall be sufficient to ensure that all required total maximum daily loads will be developed within fifteen years of the date the list is approved by the environmental protection agency. Total maximum daily loads that are required to be developed for navigable waters that are included for the first time on subsequent lists shall be developed within fifteen years of the initial inclusion of the water on the list.

C. As part of the rule making prescribed by section 49-232, subsection C, the department shall identify the factors that it will use to prioritize navigable waters that require development of total maximum daily loads. At a minimum and to the extent relevant data is available, the department shall

consider the following factors in prioritizing navigable waters for development of total maximum daily loads:
1. The designated uses of the navigable water.
2. The type and extent of risk from the impairment to human health or aquatic life.
3. The degree of public interest and support, or its lack.
4. The nature of the navigable water, including whether it is an ephemeral, intermittent or effluent-dependent water.
5. The pollutants causing the impairment.
6. The severity, magnitude and duration of the violation of the applicable surface water quality standard.
7. The seasonal variation caused by natural events such as storms or weather patterns.
8. Existing treatment levels and management practices.
9. The availability of effective and economically feasible treatment techniques, management practices or other pollutant loading reduction measures.
10. The recreational and economic importance of the water.
11. The extent to which the impairment is caused by discharges or activities that have ceased.
12. The extent to which natural sources contribute to the impairment.
13. Whether the water is accorded special protection under federal or state water quality law.
14. Whether action that is taken or that is likely to be taken under other programs, including voluntary programs, is likely to make significant progress toward achieving applicable standards even if a total maximum daily load is not developed.
15. The time expected to be required to achieve compliance with applicable surface water quality standards.
16. The availability of documented, effective analytical tools for developing a total maximum daily load for the water with reasonable accuracy.
17. Department resources and programmatic needs.

49-234. Total maximum daily loads; implementation plans

A. The department shall develop total maximum daily loads for those navigable waters listed as impaired pursuant to this article and for which total maximum daily loads are required to be adopted pursuant to 33 United States Code section 1313(d) and the regulations implementing that statute. The department may estimate total maximum daily loads for navigable waters not listed as impaired pursuant to this article, for the purposes of developing information to satisfy the requirements of 33 United States Code section 1313(d)(3), only after it has developed total maximum daily loads for all navigable waters identified as impaired pursuant to this article or if necessary to support permitting of new point source discharges.

B. In developing total maximum daily loads, the department shall use only statistical and modeling techniques that are properly validated and broadly accepted by the scientific community. The modeling technique may vary based on the type of water and the quantity and quality of available data that meets the quality assurance and quality control requirements of section 49-232. The department may establish the statistical and modeling techniques in rules adopted pursuant to section 49-232, subsection C.

C. Each total maximum daily load shall:
1. Be based on data and methodologies that comply with section 49-232.
2. Be established at a level that will achieve and maintain compliance with applicable surface water quality standards.
3. Include a reasonable margin of safety that takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. The margin of safety shall not be used as a substitute for adequate data when developing the total maximum daily load.
4. Account for seasonal variations that may include setting total maximum daily loads that apply on a seasonal basis.

D. For each impaired water, the department shall prepare a draft estimate of the total amount of each pollutant that causes the impairment from all sources and that may be added to the navigable water while still allowing the navigable water to achieve and maintain applicable surface water quality standards. The department shall provide public notice and allow for comment on each draft estimate and shall prepare written responses to comments received on the draft estimates. The department shall publish the determinations of total pollutant loadings that will not result in impairment that it intends to submit initially to the regional administrator, along with a summary of the responses to comments on the estimated loadings, in the Arizona administrative register at least forty-five days before submission of the loadings to the regional administrator. Publication of the loadings in the administrative register is an appealable agency action pursuant to title 41, chapter 6, article 10 that may be appealed by any party that submitted written comments on the estimated loadings. If the department receives a notice of appeal of a loading pursuant to section 41-1092, subsection B within forty-five days of the publication of the loading in the Arizona administrative register, the department shall not submit the challenged loading to the regional administrator until either the challenge to the loading is withdrawn or the director has made a final administrative decision

pursuant to section 41-1092.08.

E. After each final loading pursuant to subsection D of this section is adopted and consistent with subsection F of this section, the department shall determine draft allocations among the contributing sources that are sufficient to achieve the total loading established pursuant to subsection D of this section. the department's proposed determination of allocations shall be subject to public notice and comment. The department shall prepare written responses to comments received on the draft allocations. After consideration of public comment received, the department shall publish the allocations and a summary of the responses to comments in the Arizona administrative register. The publication shall occur at least forty-five days before submission of the allocations to the regional administrator, if such submission is required by the rules implementing 33 United States Code section 1313(d). Publication of the allocations in the Arizona administrative register is an appealable agency action pursuant to title 41, chapter 6, article 10 that may be appealed by any party that submitted written comments on the draft allocations. If the department receives a notice of appeal of an allocation pursuant to section 41-1092, subsection B within forty-five days of the publication of the allocation in the Arizona administrative register, the department shall not take further action on the challenged allocation, or submit it to the regional administrator if such submission is required by the rules implementing 33 United States Code section 1313(d), until either the challenge to the loading is withdrawn or the director has made a final administrative decision pursuant to section 41-1092.08.

F. The department shall make reasonable and equitable allocations among sources when developing total maximum daily loads. At a minimum, the department shall consider the following factors in making allocations:
1. The environmental, economic and technological feasibility of achieving the allocation.
2. The cost and benefit associated with achieving the allocation.
3. Any pollutant loading reductions that are reasonably expected to be achieved as a result of other legally required actions or voluntary measures.

G. For each total maximum daily load, the department shall establish a TMDL implementation plan that explains how the allocations and any reductions in existing pollutant loadings will be achieved. Any reductions in loadings from nonpoint sources shall be achieved voluntarily. The department shall provide for public notice and comment on each TMDL implementation plan. Any sampling or monitoring components of a TMDL implementation plan shall comply with section 49-232.

H. Each TMDL implementation plan shall provide the time frame in which compliance with applicable surface water quality standards is expected to be achieved. The plan may include a phased process with interim targets for load reductions. Longer time frames are appropriate in situations involving multiple dischargers, technical, legal or economic barriers to achieving necessary load reductions, scientific uncertainty regarding data quality or modeling, significant loading from natural sources or significant loading resulting from discharges or activities that have already ceased.

I. For navigable waters that are impaired due in part to historical factors that are difficult to address, including contaminated sediments, the department shall consider those historical factors in determining allocations for existing point source discharges of the pollutant or pollutants that cause the impairment. In developing total maximum daily loads for those navigable waters, the department shall use a phased approach in which expected long-term loading reductions from the historical sources are considered in establishing short-term allocations for the point sources. While total maximum daily loads and TMDL implementation plans are being completed, any permits issued for the point sources are deemed consistent with this article if the permits require reasonable reductions in the discharges of the pollutants causing the impairment and are not required to include additional reductions if those reductions would not significantly contribute to attainment of surface water quality standards.

J. After a total maximum daily load and a TMDL implementation plan have been adopted for a navigable water, the department shall review the status of the navigable water at least once every five years to determine if compliance with applicable surface water quality standards has been achieved. If compliance with applicable surface water quality standards has not been achieved, the department shall evaluate whether modification of the total maximum daily load or TMDL implementation plan is required.

49-235. Rules
The department shall adopt any rules necessary to implement this article.

49-236. Report
By September 1, 2005, the department shall submit a report to the governor, the speaker of the house of representatives and the president of the senate detailing progress made under this program and shall provide a copy to the secretary of state and the department of library, archives and public records. At

a minimum, the report shall:
1. Evaluate the effectiveness of the total maximum daily load program and identify any recommended statutory changes to make the program more efficient, effective and equitable.
2. Assess the extent to which water quality problems that cannot be effectively addressed under the total maximum daily load program may be addressed under other federal or state laws.
3. Identify the number of appeals of department decisions under this article sought pursuant to title 41, chapter 6, article 10 and the disposition of those appeals, and assess the impact of those appeals on the department's ability to administer the program effectively.

49-237. Impact of successful judicial appeal of Arizona Department of Environmental Quality decision

If a person appeals to court and succeeds in overturning or modifying a final administrative decision of the director pursuant to this article in an appeal initiated pursuant to title 41, chapter 6, article 10, within thirty days of the court's decision the department shall take the steps necessary to implement the court's decision, unless the director's decision that is overturned or modified was submitted to and approved by the regional administrator, in which case within thirty days of the court's decision the department shall request that the regional administrator modify the approval to reflect the court's decision.

49-238. Program termination

The program established by this article ends on July 1, 2010 pursuant to section 41-3102.

TITLE 18. ENVIRONMENTAL QUALITY
CHAPTER 11. DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY STANDARDS

ARTICLE 6. IMPAIRED WATER IDENTIFICATION

R18-11-601. Definitions

In addition to the definitions established in A.R.S. §§ 49-201 and 49-231, and A.A.C. R18-11-101, the following terms apply to this Article:

1. "303(d) List" means the list of surface waters or segments required under section 303(d) of the Clean Water Act and A.R.S. Title 49, Chapter 2, Article 2.1, for which TMDLs are developed and submitted to EPA for approval.
2. "Attaining" means there is sufficient, credible, and scientifically defensible data to assess a surface water or segment and the surface water or segment does not meet the definition of impaired or not attaining.
3. "AZPDES" means the Arizona Pollutant Elimination Discharge System.
4. "Credible and scientifically defensible data" means data submitted, collected, or analyzed using:
    a. Quality assurance and quality control procedures under A.A.C. R18-11-602;
    b. Samples or analyses representative of water quality conditions at the time the data were collected;
    c. Data consisting of an adequate number of samples based on the nature of the water in question and the parameters being analyzed; and
    d. Methods of sampling and analysis, including analytical, statistical, and modeling methods that are generally accepted and validated by the scientific community as appropriate for use in assessing the condition of the water.
5. "Designated use" means those uses specified in 18 A.A.C. 11, Article 1 for each surface water or segment whether or not they are attaining.
6. "EPA" means the U.S. Environmental Protection Agency.
7. *"Impaired water" means a Navigable water for which credible scientific data exists that satisfies the requirements of § 49-232 and that demonstrates that the water should be identified pursuant to 33 United States Code § 1313(d) and the regulations implementing that statute.* A.R.S. § 49-231(1).
8. "Laboratory detection limit" means a "Method Reporting Limit" (MRL) or "Reporting Limit" (RL). These analogous terms describe the laboratory reported value, which is the lowest concentration level included on the calibration curve from the analysis of a pollutant that can be quantified in terms of precision and accuracy.
9. "Monitoring entity" means the Department or any person who collects physical, chemical, or biological data used for an impaired water identification or a TMDL decision.
10. "Naturally occurring condition" means the condition of a surface water or segment that would have occurred in the absence of pollutant loadings as a result of human activity.
11. "Not attaining" means a surface water is assessed as impaired, but is not placed on the 303(d) List because:
    a. A TMDL is prepared and implemented for the surface water;
    b. An action, which meets the requirements of R18-11-604(D)(2)(h), is occurring and is expected to bring the surface water to attaining before the next 303(d) List submission; or
    c. The impairment of the surface water is due to pollution but not a pollutant, for which a TMDL load allocation cannot be developed.
12. "NPDES" means National Pollutant Discharge Elimination System.
13. "Planning List" means a list of surface waters and segments that the Department will review and evaluate to determine if the surface water or segment is impaired and whether a TMDL is necessary.
14. *"Pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.* 33 U.S.C. 1362(6). Characteristics of water, such as dissolved oxygen, pH, temperature, turbidity, and suspended sediment are considered pollutants if they result or may result in the non-attainment of a water quality standard.
15. *"Pollution" means "the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water.* 33 U.S.C. 1362(19).
16. "QAP" means a quality assurance plan detailing how environmental data operations are planned, implemented, and assessed for quality during the duration of a project.
17. "Sampling event" means one or more samples taken under consistent conditions on one or more days at a distinct station or location.
18. "SAP" means a site specific sampling and analysis plan that describes the specifics of sample collection to ensure that data quality objectives are met and that samples collected and analyzed are representative of surface water conditions at the time of sampling.

19. "Spatially independent sample" means a sample that is collected at a distinct station or location. The sample is independent if the sample was collected:

a. More than 200 meters apart from other samples, or

b. Less than 200 meters apart, and collected to characterize the effect of an intervening tributary, outfall or other pollution source, or significant hydrographic or hydrologic change.

20. "Temporally independent sample" means a sample that is collected at the same station or location more than seven days apart from other samples.

21. "Threatened" means that a surface water or segment is currently attaining its designated use, however, trend analysis, based on credible and scientifically defensible data, indicates that the surface water or segment is likely to be impaired before the next listing cycle.

22. "TMDL" means total maximum daily load.

23. "TMDL decision" means a decision by the Department to:

a. Prioritize an impaired water for TMDL development,

b. Develop a TMDL for an impaired water, or

c. Develop a TMDL implementation plan.

24. *"Total maximum daily load" means an estimation of the total amount of a pollutant from all sources that may be added to a water while still allowing the water to achieve and maintain applicable surface water quality standards. Each total maximum daily load shall include allocations for sources that contribute the pollutant to the water, as required by section 303(d) of the clean water act (33 United States Code section 1313(d)) and regulations implementing that statute to achieve applicable surface water quality standards.* A.R.S. § 49-231(4).

25. "Water quality standard" means a standard composed of designated uses (classification of waters), the numerical and narrative criteria applied to the specific water uses or classification, the antidegradation policy, and moderating provisions, for example, mixing zones, site-specific alternative criteria, and exemptions, in A.A.C. Title 18, Chapter 11, Article 1.

26. "WQARF" means the water quality assurance revolving fund established under A.R.S. § 49-282.

R18-11-602. Credible Data

A. Data are credible and relevant to an impaired water identification or a TMDL decision when:

1. Quality Assurance Plan. A monitoring entity, which contribute data for an impaired water identification or a TMDL decision, provides the Department with a QAP that contains, at a minimum, the elements listed in subsections (A)(1)(a) through (A)(1)(f). The Department may accept a QAP containing less than the required elements if the Department determines that an element is not relevant to the sampling activity and that its omission will not impact the quality of the results based upon the type of pollutants to be sampled, the type of surface water, and the purpose of the sampling.

a. An approval page that includes the date of approval and the signatures of the approving officials, including the project manager and project quality assurance manager;

b. A project organization outline that identifies all key personnel, organizations, and laboratories involved in monitoring, including the specific roles and responsibilities of key personnel in carrying out the procedures identified in the QAP and SAP, if applicable;

c. Sampling design and monitoring data quality objectives or a SAP that meets the requirements of subsection (A)(2) to ensure that:

i. Samples are spatially and temporally representative of the surface water,

ii. Samples are representative of water quality conditions at the time of sampling, and

iii. The monitoring is reproducible;

d. The following field sampling information to assure that samples meet data quality objectives:

i. Sampling and field protocols for each parameter or parametric group, including the sampling methods, equipment and containers, sample preservation, holding times, and any analysis proposed for completion in the field or outside of a laboratory;

ii. Field and laboratory methods approved under subsection(A)(5);

iii. Handling procedures to identify samples and custody protocols used when samples are brought from the field to the laboratory for analysis;

iv. Quality control protocols that describe the number and type of field quality control samples for the project that

includes, if appropriate for the type of sampling being conducted, field blanks, travel blanks, equipment blanks, method blanks, split samples, and duplicate samples;

v. Procedures for testing, inspecting, and maintaining field equipment;

vi. Field instrument calibration procedures that describe how and when field sampling and analytical instruments will be calibrated;

vii. Field notes and records that describe the conditions that require documentation in the field, such as weather, stream flow, transect information, distance from water edge, water and sample depth, equipment calibration measurements, field observations of watershed activities, and bank conditions. Indicate the procedures implemented for maintaining field notes and records and the process used for attaching pertinent information to monitoring results to assist in data interpretation;

viii. Minimum training and any specialized training necessary to do the monitoring, that includes the proper use and calibration of field equipment used to collect data, sampling protocols, quality assurance/quality control procedures, and how training will be achieved;

e. Laboratory analysis methods and quality assurance/quality control procedures that assure that samples meet data quality objectives, including:

i. Analytical methods and equipment necessary for analysis of each parameter, including identification of approved laboratory methods described in subsection (A)(5), and laboratory detection limits for each parameter;

ii. The name of the designated laboratory, its license number, if licensed by the Arizona Department of Health Services, and the name of a laboratory contact person to assist the Department with quality assurance questions;

iii. Quality controls that describe the number and type of laboratory quality control samples for the project, including, if appropriate for the type of sampling being conducted, field blanks, travel blanks, equipment blanks, method blanks, split samples, and duplicate samples;

iv. Procedures for testing, inspecting, and maintaining laboratory equipment and facilities;

v. A schedule for calibrating laboratory instruments, a description of calibration methods, and a description of how calibration records are maintained; and

vi. Sample equipment decontamination procedures that outline specific methods for sample collection and preparation of equipment, identify the frequency of decontamination, and describe the procedures used to verify decontamination;

f. Data review, management, and use that includes the following:

i. A description of the data handling process from field to laboratory, from laboratory to data review and validation, and from validation to data storage and use. Include the role and responsibility of each person for each step of the process, type of database or other storage used, and how laboratory and field data qualifiers are related to the laboratory result;

ii. Reports that describe the intended frequency, content, and distribution of final analysis reports and project status reports;

iii. Data review, validation, and verification that describes the procedure used to validate and verify data, the procedures used if errors are detected, and how data are accepted, rejected, or qualified; and

iv. Reconciliation with data quality objectives that describes the process used to determine whether the data collected meets the project objectives, which may include discarding data, setting limits on data use, or revising data quality objectives.

2. Sampling and analysis plan.

a. A monitoring entity shall develop a SAP that contains, at a minimum, the following elements:

i. The experimental design of the project, the project goals and objectives, and evaluation criteria for data results;

ii. The background or historical perspective of the project;

iii. Identification of target conditions, including a discussion of whether any weather, seasonal variations, stream flow, lake level, or site access may affect the project and the consideration of these factors;

iv. The data quality objectives for measurement of data that describe in quantitative and qualitative terms how the data

meet the project objectives of precision, accuracy, completeness, comparability, and representativeness;
v. The types of samples scheduled for collection;
vi. The sampling frequency;
vii. The sampling periods;
viii. The sampling locations and rationale for the site selection, how site locations are benchmarked, including scaled maps indicating approximate location of sites; and
ix. A list of the field equipment, including tolerance range and any other manufacturer's specifications relating to accuracy and precision.

b. The Department may accept a SAP containing less than the required elements if the Department determines that an element is not relevant to the sampling activity and that its omission will not impact the quality of the results based upon the type of pollutants to be samples, the type of surface water, and the purpose of the sampling.

3. [Options] The monitoring entity may include any of the following in the QAP or SAP:

a. The name, title, and role of each person and organization involved in the project, identifying specific roles and responsibilities for carrying out the procedures identified in the QAP and SAP;

b. A distribution list of each individual and organization receiving a copy of the approved QAP and SAP;

c. A table of contents;

d. A health and safety plan;

e. The inspection and acceptance requirements for supplies;

f. The data acquisition that describes types of data not obtained through this monitoring activity, but used in the project;

g. The audits and response actions that describe how field, laboratory, and data management activities and sampling personnel are evaluated to ensure data quality, including a description of how the project will correct any problems identified during these assessments; and

h. The waste disposal methods that identify wastes generated in sampling and methods for disposal of those wastes.

4. Exceptions. The Department may determine that the following data are also credible and relevant to an impaired water identification or TMDL decision when data were collected, provided the conditions in subsections (A)(5), (A)(6), and (B) are met, and where the data were collected in the surface water or segment being evaluated for impairment:

a. The data were collected before July 12, 2002 and the Department determines that the data yield results of comparable reliability to the data collected under subsections (A)(1) and (A)(2);

b. The data were collected after July 12, 2002 as part of an ongoing monitoring effort by a governmental agency and the Department determines that the data yield results of comparable reliability to the data collected under subsections (A)(1) and (A)(2); or

c. The instream water quality data were or are collected under the terms of a NPDES or AZPDES permit or a compliance order issued by the Department or EPA, a consent decree signed by the Department or EPA, or a sampling program approved by the Department or EPA under WQARF or CERCLA, and the Department determines that the data yield results of comparable reliability to data collected under subsections (A)(1) and (A)(2).

5. Data collection, preservation, and analytical procedures. The monitoring entity shall collect, preserve, and analyze data using methods of sample collection, preservation, and analysis established under A.A.C. R9-14-610.

6. Laboratory. The monitoring entity shall ensure that chemical and toxicological samples are analyzed in a state-licensed laboratory, a laboratory exempted by the Arizona Department of Health Services for specific analyses, or a federal or academic laboratory that can demonstrate proper quality assurance/quality control procedures substantially equal to those required by the Arizona Department of Health Services, and shall ensure that the laboratory uses approved methods identified in A.A.C. R9-14--610.

B. Documentation for data submission. The monitoring entity shall provide the Department with the following information either before or with data submission:

1. A copy of the QAP or SAP, or both, revisions to a previously submitted QAP or SAP, and any other information necessary for the Department to evaluate the data under subsection (A)(4);
2. The applicable dates of the QAP and SAP, including any revisions;
3. Written assurance that the methods and procedures specified in the QAP and SAP were followed;
4. The name of the laboratory used for sample analyses and its certification number, if the laboratory is licensed by the Arizona Department of Health Services;
5. The quality assurance/quality control documentation, including

the analytical methods used by the laboratory, method number, detection limits, and any blank, duplicate, and spike sample information necessary to properly interpret the data, if different from that stated in the QAP or SAP;

6. The data reporting unit of measure;

7. Any field notes, laboratory comments, or laboratory notations concerning a deviation from standard procedures, quality control, or quality assurance that affects data reliability, data interpretation, or data validity; and

8. Any other information, such as complete field notes, photographs, climate, or other information related to flow, field conditions, or documented sources of pollutants in the watershed, if requested by the Department for interpreting or validating data.

C. Recordkeeping. The monitoring entity shall maintain all records, including sample results, for the duration of the listing cycle. If a surface water or segment is added to the Planning List or to the 303(d) List, the Department shall coordinate with the monitoring entity to ensure that records are kept for the duration of the listing.

R18-11-603. General Data Interpretation Requirements

A. The Department shall use the following data conventions to interpret data for impaired water identifications and TMDL decisions:

1. Data reported below laboratory detection limits.

a. When the analytical result is reported as <X, where X is the laboratory detection limit for the analyte and the laboratory detection limit is less than or equal to the surface water quality standard, consider the result as meeting the water quality standard:

i. Use these statistically derived values in trend analysis, descriptive statistics or modeling if there is sufficient data to support the statistical estimation of values reported as less than the laboratory detection limit; or

ii. Use one-half of the value of the laboratory detection limit in trend analysis, descriptive statistics, or modeling, if there is insufficient data to support the statistical estimation of values reported as less than the laboratory detection limit.

b. When the sample value is less than or equal to the laboratory detection limit but the laboratory detection limit is greater than the surface water quality standard, shall not use the result for impaired water identifications or TMDL decisions;

2. Identify the field equipment specifications used for each listing cycle or TMDL developed. A field sample measurement within the manufacturer's specification for accuracy meets surface water quality standards;

3. Resolve a data conflict by considering the factors identified under the weight-of-evidence determination in R18-11-605(B);

4. When multiple samples from a surface water or segment are not spatially or temporally independent, or when lake samples are from multiple depths, use the following resultant value to represent the specific dataset:

a. The appropriate measure of central tendency for the dataset for:

i. A pollutant listed in the surface water quality standards 18 A.A.C. 11, Article 1, Appendix A, Table 1, except for nitrate or nitrate/nitrite;

ii. A chronic water quality standard for a pollutant listed in 18 A.A.C. 11, Article 1, Appendix A, Table 2;

iii. A surface water quality standard for a pollutant that is expressed as an annual or geometric mean;

iv. The surface water quality standard for temperature or the single sample maximum water quality standard for suspended sediment concentration, nitrogen, and phosphorus in R18-11-109;

v. The surface water quality standard for radiochemicals in R18-11-109(G); or

vi. Except for chromium, all single sample maximum water quality standards in R18-11-112.

b. The maximum value of the dataset for:

i. The acute water quality standard for a pollutant listed in 18 A.A.C. 11, Article 1, Appendix A, Table 2 and acute water quality standard in R18-11-112;

ii. The surface water quality standard for nitrate or nitrate/nitrite in 18 A.A.C. 11, Article 1, Appendix A, Table 1;

iii. The single sample maximum water quality standard for bacteria in subsections R18-11-109(A); or

iv. The 90th percentile water quality standard for nitrogen and phosphorus in R18-11-109(F) and R18-11-112.

c. The worst case measurement of the dataset for:

i. Surface water quality standard for dissolved oxygen under R18-11-109(E). For purposes of this subsection, worst case measurement means the minimum value for dissolved oxygen;

ii. Surface water quality standard for pH under R18-11-109(B). For purposes of this subsection, "worst case measurement" means both the minimum and maximum value for pH.

B. The Department shall not use the following data for placing a surface water or segment on the Planning List, the 303(d) List, or in making a TMDL decision.

1. Any measurement outside the range of possible physical or chemical measurements for the pollutant or measurement equipment,
2. Uncorrected data transcription errors or laboratory errors, and
3. An outlier identified through statistical procedures, where further evaluation determines that the outlier represents a valid measure of water quality but should be excluded from the dataset.

C. The Department may employ fundamental statistical tests if appropriate for the collected data and type of surface water when evaluating a surface water or segment for impairment or in making a TMDL decision. The statistical tests include descriptive statistics, frequency distribution, analysis of variance, correlation analysis, regression analysis, significance testing, and time series analysis.

D. The Department may employ modeling when evaluating a surface water or segment for impairment or in making a TMDL decision, if the method is appropriate for the type of waterbody and the quantity and quality of available data meet the requirements of R18-11-602. Modeling methods include:

a. Better Assessment Science Integrating Source and Nonpoint Sources (BASINS),
b. Fundamental statistics, including regression analysis,
c. Hydrologic Simulation Program-Fortran (HSPF),
d. Spreadsheet modeling, and
e. Hydrologic Engineering Center (HEC) programs developed by the Army Corps of Engineers.

R18-11-604. Types of Surface Waters Placed on the Planning List and 303(d) List

A. The Department shall evaluate, at least every five years, Arizona's surface waters by considering all readily available data.

1. The Department shall place a surface water or segment on:

a. The Planning List if it meets any of the criteria described in subsection (D),or

b. The 303(d) List if it meets the criteria for listing described in subsection (E).

2. The Department shall remove a surface water or segment from the Planning List based on the requirements in R18-11-605(E)(1) or from the 303(d) List, based on the requirements in R18-11-605(E)(2).
3. The Department may move surface waters or segments between the Planning List and the 303(d) List based on the criteria established in R18-11-604 and R18-11-605.

B. When placing a surface water or segment on the Planning List or the 303(d) List, the Department shall list the stream reach, derived from EPA's Reach File System *or National Hydrography Dataset*, or the entire lake, unless the data indicate that only a segment of the stream reach or lake is impaired or not attaining its designated use, in which case, the Department shall describe only that segment for listing.

C. Exceptions. The Department shall not place a surface water or segment on either the Planning List or the 303(d) List if the non-attainment of a surface water quality standard is due to one of the following:

1. Pollutant loadings from naturally occurring conditions alone are sufficient to cause a violation of applicable water quality standards;
2. The data were collected within a mixing zone or under a variance or nutrient waiver established in a NPDES or AZPDES permit for the specific parameter and the result does not exceed the alternate discharge limitation established in the permit. The Department may use data collected within these areas for modeling or allocating loads in a TMDL decision; or
3. An activity exempted under R18-11-117, R18-11-118, or a condition exempted under R18-11-119.

D. Planning List.

1. The Department shall:

a. Use the Planning List to prioritize surface waters for monitoring and evaluation as part of the Department's watershed management approach;

b. Provide the Planning List to EPA; and

c. Evaluate each surface water and segment on the Planning List for impairment based on the criteria in R18-11-605(D) to determine the source of the impairment.

2. The Department shall place a surface water or segment on the Planning List based the criteria in R18-11-605(C). The Department may also include a surface water or segment on the Planning List when:

a. A TMDL is completed for the pollutant and approved by EPA;

b. The surface water or segment is on the 1998 303(d) List but the dataset used for the listing:

i. Does not meet the credible data requirements of R18-11-602, or

ii. Contains insufficient samples to meet the data requirements under R18-11-605(D);

c. Some monitoring data exist but there are insufficient data to determine whether the surface water or segment is impaired or not attaining, including:

i. A numeric surface water quality standard is exceeded, but there are not enough samples or sampling events to fulfill the requirements of R18-11-605(D);

ii. Evidence exists of a narrative standard violation, but the amount of evidence is insufficient, based on narrative implementation procedures and the requirements of R18-11-605(D)(3);

iii. Existing monitoring data do not meet credible data requirements in R18-11-602; or

iv. A numeric surface water quality standard is exceeded, but there are not enough sample results above the laboratory detection limit to support statistical analysis as established in R18-11-603(A)(1).

d. The surface water or segment no longer meets the criteria for impairment based on a change in the applicable surface water quality standard or a designated use approved by EPA under section 303(c)(1) of the Clean Water Act, but insufficient current or original monitoring data exist to determine whether the surface water or segment will meet current surface water quality standards;

e. Trend analysis using credible and scientifically defensible data indicate that surface water quality standards may be exceeded by the next assessment cycle;

f. The exceedance of surface water quality standards is due to pollution, but not a pollutant;

g. Existing data were analyzed using methods with laboratory detection limits above the numeric surface water quality standard but analytical methods with lower laboratory detection limits are available;

h. The surface water or segment is expected to attain its designated use by the next assessment as a result of existing or proposed technology-based effluent limitations or other pollution control requirements under local, state, or federal authority. The appropriate entity shall provide the Department with the following documentation to support placement on the Planning List:

i. Verification that discharge controls are required and enforceable;

ii. Controls are specific to the surface water or segment, and pollutant of concern;

iii. Controls are in place or scheduled for implementation; and

iv. There are assurances that the controls are sufficient to bring about attainment of water quality standards by the next 303(d) List submission; or

i. The surface water or segment is threatened due to a pollutant and, at the time the Department submits a final 303(d) List to EPA, there are no federal regulations implementing section 303(d) of the Clean Water Act that require threatened waters be included on the list.

E. 303(d) List. The Department shall:

1. Place a surface water or segment on the 303(d) List if the Department determines:

a. Based on R18-11-605(D), that the surface water or segment is impaired due to a pollutant and that a TMDL decision is necessary; or

b. That the surface water or segment is threatened due to a pollutant and, at the time the Department submits a final 303(d) List to EPA, there are federal regulations implementing section 303(d) of the Clean Water Act that require threatened waters be included on the list.

2. Provide public notice of the 303(d) List according to the requirements of A.R.S. § 49-232 and submit the 303(d) List according to section 303(d) of the Clean Water Act.

R18-11-605. Evaluating A Surface Water or Segment For Listing and Delisting

A. The Department shall compile and evaluate all reasonably current, credible, and scientifically defensible data to determine whether a surface water or segment is impaired or not attaining.

B. Weight-of-evidence approach.

1. The Department shall consider the following concepts when evaluating data:

a. Data or information collected during critical conditions may be considered separately from the complete dataset, when the data show that the surface water or segment is impaired or not attaining its designated use during those critical conditions, but attaining its uses during other periods. Critical conditions may include stream flow, seasonal periods, weather conditions, or anthropogenic activities;

b. Whether the data indicate that the impairment is due to persistent, seasonal, or recurring conditions. If the data do not represent persistent, recurring, or seasonal conditions, the Department may place the surface water or segment on the Planning List;

c. Higher quality data over lower quality data when making a listing decision. Data quality is established by the reliability, precision, accuracy, and representativeness of the data, based on factors identified in R18-11-602(A) and (B), including monitoring methods, analytical methods, quality control procedures, and the documented field and laboratory quality control information submitted with the data. The Department shall consider the following factors when determining higher quality data:

i. The age of the measurements. Newer measurements are weighted heavier than older measurements, unless the older measurements are more representative of critical flow conditions;

ii. Whether the data provide a direct measure of an impact on a designated use. Direct measurements are weighted heavier than measurements of an indicator or surrogate parameter; or

iii. The amount or frequency of the measurements. More frequent data collection are weighted heavier than nominal datasets.

2. The Department shall evaluate the following factors to determine if the water quality evidence supports a finding that the surface water or segment is impaired or not attaining:

a. An exceedance of a numeric surface water quality standard based on the criteria in subsections (C)(1), (C)(2), (D)(1), and (D)(2);

b. An exceedance of a narrative surface water quality standard based on the criteria in subsections (C)(3) and (D)(3);

c. Additional information that determines whether a water quality standard is exceeded due to a pollutant, suspected pollutant, or naturally occurring condition:

i. Soil type, geology, hydrology, flow regime, biological community, geomorphology, climate, natural process, and anthropogenic influence in the watershed;

ii. The characteristics of the pollutant, such as its solubility in water, bioaccumulation potential, sediment sorption potential, or degradation characteristics, to assist in determining which data more accurately indicate the pollutant's presence and potential for causing impairment; and

iii. Available evidence of direct or toxic impacts on aquatic life, wildlife, or human health, such as fish kills and beach closures, where there is sufficient evidence that these impacts occurred due to water quality conditions in the surface water.

d. Other available water quality information, such as NPDES or AZPDES water quality discharge data, as applicable.

e. If the Department determines that a surface water or segment does not merit listing under numeric water quality standards based on criteria in subsections (C)(1), (C)(2), (D)(1), or (D)(2) for a pollutant, but there is evidence of a narrative standard exceedance in that surface water or segment under subsection (D)(3) as a result of the presence of the same pollutant, the Department shall list the surface water or segment as impaired only when the evidence indicates that the numeric water quality standard is insufficient to protect the designated use of the surface water or segment and the Department justifies the listing based on any of the following:

i. The narrative standard data provide a more direct indication of impairment as supported by professionally prepared and peer-reviewed publications;

ii. Sufficient evidence of impairment exists due to synergistic effects of pollutant combinations or site-specific environmental factors; or

iii. The pollutant is bioaccumulative, relatively insoluble in water, or has other characteristics that indicate it is occurring

in the specific surface water or segment at levels below the laboratory detection limits, but at levels sufficient to result in an impairment.

3. The Department may consider a single line of water quality evidence when the evidence is sufficient to demonstrate that the surface water or segment is impaired or not attaining.

C. Planning List.

1. When evaluating a surface water or segment for placement on the Planning List.

a. Consider at least ten spatially or temporally independent samples collected over three or more temporally independent sampling events; and

b. Determine numeric water quality standards exceedances. The Department shall:

i. Place a surface water or segment on the Planning List following subsection (B), if the number of exceedances of a surface water quality standard is greater than or equal to the number listed in Table 1, which provides the number of exceedances that indicate a minimum of a 10 percent exceedance frequency with a minimum of a 80 percent confidence level using a binomial distribution for a given sample size; or

ii. For sample datasets exceeding those shown in **Table 1**, calculate the number of exceedances using the following equation: $(X \geq x | n, p)$ where n = number of samples; p = exceedance probability of 0.1; x = smallest number of exceedances required for listing with "n" samples; and confidence level ≥ 80 percent.

2. When there are less than ten samples, the Department shall place a surface water or segment on the Planning List following subsection (B), if three or more temporally independent samples exceed the following surface water quality standards:

a. The surface water quality standard for a pollutant listed in 18 A.A.C. 11, Article 1, Appendix A, Table 1, except for nitrate or nitrate/nitrite;

b. The surface water quality standard for temperature or the single sample maximum water quality standard for suspended sediment concentration, nitrogen, and phosphorus in R18-11-109;

c. The surface water quality standard for radiochemicals in R18-11-109(G);

d. The surface water quality standard for dissolved oxygen under R18-11-109(E);

e. The surface water quality standard for pH under R18-11-109(B); or

f. The following surface water quality standards in R18-11-112:

i. Single sample maximum standards for nitrogen and phosphorus,

ii. All metals except chromium, or

iii. Turbidity.

3. The Department shall place a surface water or segment on the Planning List if information in subsections (B)(2)(c), (B)(2)(d), and (B)(2)(e) indicates that a narrative water quality standard violation exists, but no narrative implementation procedure required under A.R.S. § 49-232(F) exists to support use of the information for listing.

D. 303(d) List.

1. When evaluating a surface water or segment for placement on the 303(d) List.

a. Consider at least 20 spatially or temporally independent samples collected over three or more temporally independent sampling events; and

b. Determine numeric water quality standards exceedances. The Department shall:

i. Place a surface water or segment on the 303(d) List, following subsection (B), if the number of exceedances of a surface water quality standard is greater than or equal to the number listed in Table 2, which provides the number of exceedances that indicate a minimum of a 10 percent exceedance frequency with a minimum of a 90 percent confidence level using a binomial distribution, for a given sample size; or

ii. For sample datasets exceeding those shown in Table 2, calculate the number of exceedances using the following equation: $(X \geq x | n, p)$ where n = number of samples; p = exceedance probability of 0.1; x = smallest number of exceedances required for listing with "n" samples; and confidence level ≥ 90 percent.

2. The Department shall place a surface water or segment on the 303(d) List, following subsection (B) without the required number of samples or numeric water quality standard exceedances under subsection (D)(1), if either the following conditions occur:

a. More than one temporally independent sample in any consecutive three-year period exceeds the surface water quality standard in:

i. The acute water quality standard for a pollutant listed in 18 A.A.C. 11, Article 1, Appendix A, Table 2 and the acute water quality standards in R18-11-112;

ii. The surface water quality standard for nitrate or nitrate/nitrite in 18 A.A.C. 11, Article 1, Appendix A, Table 1; or

iii. The single sample maximum water quality standard for bacteria in subsections R18-11-109(A).

b. More than one exceedance of an annual mean, 90th percentile, aquatic and wildlife chronic water quality standard, or a bacteria 30-day geometric mean water quality standard occurs, as specified in R18-11-109, R18-11-110, R18-11-112, or 18 A.A.C. 11, Article 1, Appendix A, Table 2.

3. Narrative water quality standards exceedances. The Department shall place a surface water or segment on the Planning List if the listing requirements are met under A.R.S. § 49-232(F).

E. Removing a surface water, segment, or pollutant from the Planning List or the 303(d) List.

1. Planning List. The Department shall remove a surface water, segment, or pollutant from the Planning List when:

a. Monitoring activities indicate that:

i. There is sufficient credible data to determine that the surface water or segment is impaired under subsection (D), in which case the Department shall place the surface water or segment on the 303(d) List. This includes surface waters with an EPA approved TMDL when the Department determines that the TMDL strategy is insufficient for the surface water or segment to attain water quality standards; or

ii. There is sufficient credible data to determine that the surface water or segment is attaining all designated uses and standards.

b. All pollutants for the surface water or segment are delisted.

2. 303(d) List. The Department shall:

a. Remove a pollutant from a surface water or segment from the 303(d) List based on one or more of the following criteria:

i. The Department developed, and EPA approved, a TMDL for the pollutant;

ii. The data used for previously listing the surface water or segment under R18-11-605(D) is superseded by more recent credible and scientifically defensible data meeting the requirements of R18-11-602, showing that the surface water or segment meets the applicable numeric or narrative surface water quality standard. When evaluating data to remove a pollutant from the 303(d) List, the monitoring entity shall collect the more recent data under similar hydrologic or climatic conditions as occurred when the samples were taken that indicated impairment, if those conditions still exist;

iii. The surface water or segment no longer meets the criteria for impairment based on a change in the applicable surface water quality standard or a designated use approved by EPA under section 303(c)(1) of the Clean Water Act;

iv. The surface water or segment no longer meets the criteria for impairment for the specific narrative water quality standard based on a change in narrative water quality standard implementation procedures;

v. A re-evaluation of the data indicate that the surface water or segment does not meet the criteria for impairment because of a deficiency in the original analysis; or

vi. Pollutant loadings from naturally occurring conditions alone are sufficient to cause a violation of applicable water quality standards;

b. Remove a surface water, segment, or pollutant from the 303(d) List, based on criteria that are no more stringent than the listing criteria under subsection (D);

c. Remove a surface water or segment from the 303(d) List if all pollutants for the surface water or segment are removed from the list;

d. Remove a surface water, segment, or pollutant, from the 303(d) List and place it on the Planning List, if:

i. The surface water, segment or pollutant was on the 1998 303(d) List and the dataset used in the original listing does not meet the credible data requirements under R18-11-602, or contains insufficient samples to meet the data requirements under subsection (D); or

ii. The monitoring data indicate that the impairment is due to pollution, but not a pollutant.

R18-11-606. TMDL Priority Criteria for 303(d) Listed Surface Waters or Segments

A. In addition to the factors specified in A.R.S. § 49-233(C), the Department shall consider the following when prioritizing an impaired water for development of TMDLs:

1. A change in a water quality standard;
2. The date the surface water or segment was added to the 303(d) List;
3. The presence in a surface water or segment of species listed as threatened or endangered under section 4 of the Endangered Species Act;
4. The complexity of the TMDL;
5. State, federal, and tribal policies and priorities; and
6. The efficiencies of coordinating TMDL development with the Department's surface water monitoring program, the watershed monitoring rotation, or with remedial programs.

B. The Department shall prioritize an impaired surface water or segment for TMDL development based on the factors specified in A.R.S. § 49-233(C) and subsection (A) as follows:

1. Consider an impaired surface water or segment a high priority if:

a. The listed pollutant poses a substantial threat to the health and safety of humans, aquatic life, or wildlife based on:

i. The number and type of designated uses impaired;
ii. The type and extent of risk from the impairment to human health, aquatic life, or wildlife;
iii. The pollutant causing the impairment, or
iv. The severity, magnitude, and duration the surface water quality standard was exceeded;

b. A new or modified individual NPDES or AZPDES permit is sought for a new or modified discharge to the impaired water;

c. The listed surface water or segment is listed as a unique water in A.A.C. R18-11-112 or is part of an area classified as a "wilderness area," "wild and scenic river," or other federal or state special protection of the water resource;

d. The listed surface water or segment contains a species listed as threatened or endangered under the federal Endangered Species Act and the presence of the pollutant in the surface water or segment is likely to jeopardize the listed species;

e. A delay in conducting the TMDL could jeopardize the Department's ability to gather sufficient credible data necessary to develop the TMDL;

f. There is significant public interest and support for the development of a TMDL;

g. The surface water or segment has important recreational and economic significance to the public; or

h. The pollutant is listed for eight years or more.

2. Consider an impaired surface water or segment a medium priority if:

a. The surface water or segment fails to meet more than one designated use;

b. The pollutant exceeds more than one surface water quality standard;

c. A surface water quality standard exceedance is correlated to seasonal conditions caused by natural events, such as storms, weather patterns, or lake turnover;

d. It will take more than two years for proposed actions in the watershed to result in the surface water attaining applicable water quality standards;

e. The type of pollutant and other factors relating to the surface water or segment make the TMDL complex; or

f. The administrative needs of the Department, including TMDL schedule commitments with EPA, permitting requirements, or basin priorities that require completion of the TMDL.

3. Consider an impaired surface water or segment a low priority if:

a. The Department has formally submitted a proposal to delist the surface water, segment ,or pollutant to EPA based on R18-11-605(E)(2). If the Department makes the submission outside the listing process cycle, the change in priority ranking will not be effective until EPA approves the submittal;

b. The Department has modified, or formally proposed for modification, the designated use or applicable surface water quality standard, resulting in an impaired water no longer being impaired, but the modification has not been approved by EPA;

c. The surface water or segment is expected to attain surface water quality standards due to any of the following:

i. Recently instituted treatment levels or best management practices in the drainage area,
ii. Discharges or activities related to the impairment have ceased, or
iii. Actions have been taken and controls are in place or

scheduled for implementation that will likely to bring the surface water back into compliance;

d. The surface water or segment is ephemeral or intermittent. The Department shall re-prioritize the surface water or segment if the presence of the pollutant in the listed water poses a threat to the health and safety of humans, aquatic life, or wildlife using the water, or the pollutant is contributing to the impairment of a downstream perennial surface water or segment;

e. The pollutant poses a low ecological and human health risk;

f. Insufficient data exist to determine the source of the pollutant load;

g. The uncertainty of timely coordination with national and international entities concerning international waters;

h. Naturally occurring conditions are a major contributor to the impairment; and

i. No documentation or effective analytical tools exist to develop a TMDL for the surface water or segment with reasonable accuracy.

C. The Department will target surface waters with high priority factors in subsections (B)(1)(a) through (B)(1)(d) for initiation of TMDLs within two years following EPA approval of the 303(d) List.

D. The Department may shift priority ranking of a surface water or segment for any of the following reasons:

1. A change in federal, state, or tribal policies or priorities that affect resources to complete a TMDL;
2. Resource efficiencies for coordinating TMDL development with other monitoring activities, including the Department's ambient monitoring program that monitors watersheds on a 5-year rotational basis;
3. Resource efficiencies for coordinating TMDL development with Department remedial or compliance programs;
4. New information is obtained that will revise whether the surface water or segment is a high priority based on factors in subsection (B); and
5. Reduction or increase in staff or budget involved in the TMDL development.

E. The Department may complete a TMDL initiated before July 12, 2002 for a surface water or segment that was listed as impaired on the 1998 303(d) List but does not qualify for listing under the criteria in R18-11-605, if:

1. The TMDL investigation establishes that the water quality standard is not being met and the allocation of loads is expected to bring the surface water into compliance with standards,
2. The Department estimates that more than 50 percent of the cost of completing the TMDL has been spent,
3. There is community involvement and interest in completing the TMDL, or
4. The TMDL is included within an EPA-approved state workplan initiated before July 12, 2002.

Table 1. [Planning List] Minimum Number of Samples Exceeding the Numeric Standard

Number of Samples		Number of Samples Exceeding Standard
From	To	
10	15	3
16	23	4
24	31	5
32	39	6
40	47	7
48	56	8
57	65	9
66	73	10
74	82	11
83	91	12
92	100	13
101	109	14
110	118	15
119	126	16
127	136	17
137	145	18
146	154	19
155	163	20
164	172	21
173	181	22

Number of Samples		Number of Samples Exceeding Standard
From	To	
182	190	23
191	199	24
200	208	25
209	218	26
219	227	27
228	236	28
237	245	29
246	255	30
256	264	31
265	273	32
274	282	33
283	292	34
293	301	35
302	310	36
311	320	37
321	329	38
330	338	39
339	348	40
349	357	41
358	367	42

Number of Samples		Number of Samples Exceeding Standard
From	To	
368	376	43
377	385	44
386	395	45
396	404	46
405	414	47
415	423	48
424	432	49
433	442	50
443	451	51
452	461	52
462	470	53
471	480	54
481	489	55
490	499	56
500		57
See calculation in R18-11-605.C.1.b.ii if dataset is larger than 500 samples.		

Table 2. [Impaired Waters] Minimum Number of Samples Exceeding the Numeric Standard

MINIMUM NUMBER OF SAMPLES EXCEEDING THE NUMERIC STANDARD								
Number of Samples		Number of Samples Exceeding Standard	Number of Samples		Number of Samples Exceeding Standard	Number of Samples		Number of Samples Exceeding Standard
From	To		From	To		From	To	
20	25	5	183	191	25	362	370	45
26	32	6	192	199	26	371	379	46
33	40	7	200	208	27	380	388	47
41	47	8	209	217	28	389	397	48
48	55	9	218	226	29	398	406	49
56	63	10	227	235	30	407	415	50
64	71	11	236	244	31	416	424	51
72	79	12	245	253	32	425	434	52
80	88	13	254	262	33	435	443	53
89	96	14	263	270	34	444	452	54
97	104	15	271	279	35	453	461	55
105	113	16	280	288	36	462	470	56
114	121	17	289	297	37	471	479	57
122	130	18	298	306	38	480	489	58
131	138	19	307	315	39	490	498	59
139	147	20	316	324	40	499	500	60
148	156	21	325	333	41	See calculation in R18-11-605.D.1.b.ii if dataset is larger than 500 samples.		
157	164	22	334	343	42			
165	173	23	344	352	43			
174	182	24	353	361	44			

APPENDIX C. Arizona's Surface and Ground Water Quality Standards

SELECTED ARIZONA SURFACE WATER QUALITY NUMERIC STANDARDS (excluding VOCs, SOCs, and pesticides not used in this assessment)				
PARAMETER		**DESIGNATED USE(S)**	**STANDARD OR ASSESSMENT CRITERIA**	**CHRONIC STANDARDS**
Ammonia (NH3)		A&Wc/A&Ww	Standard varies by temperature and pH., see table in standards.	
Antimony (Sb)	dissolved	A&Wc/A&Ww A&Wedw	88 µg/L 1,000 µg/L	30 µg/L 600 µg/L
	total	DWS FBC/PBC FC	6 µg/L 56 µg/L 140 µg/L	NA
Arsenic (As)	dissolved	A&Wc/A&Ww/A&Wedw A&We	360 µg/L 440 µg/L	190 µg/L 230 µg/L
	total	DWS/FBC/PBC AGL FC AGI Peeple's Canyon Creek (Unique Waters)	50 µg/L 200 µg/L 1450 µg/L 2,000 µg/L 20 µg/L	NA
Barium (Ba)	dissolved	FBC/PBC	9,800 µg/L	NA
	total	DWS	2,000 µg/L	
Beryllium (Be)	dissolved	A&Wc/A&Ww/A&Wedw	65 µg/L	5.3 µg/L
	total	FC DWS/ FBC PBC	0.21 µg/L 4 µg/L 700 µg/L	NA NA NA
Boron (B)	total	DWS AGI FBC/PBC	630 µg/L 1,000 µg/L 12,600 µg/L	NA
Cadmium (Cd)	dissolved	A&W	Standard varies by water hardness*, see published standards.	
	total	DWS FC AgI/AgL FBC/PBC	5 µg/L 41 µg/L 50 µg/L 70 µg/L	NA
Chlorine (total residual) (Cl)		A&Wc/A&Ww/A&Wedw FBC/PBC	11 ug/L 14mg/L	5 ug/L

SELECTED ARIZONA SURFACE WATER QUALITY NUMERIC STANDARDS (excluding VOCs, SOCs, and pesticides not used in this assessment)

PARAMETER		DESIGNATED USE(S)	STANDARD OR ASSESSMENT CRITERIA	CHRONIC STANDARDS
Chromium (Cr)	dissolved	Unique Waters standards for: West Fork Little Colorado River, above Government Springs Oak Creek and West Fork Oak Creek	 10 µg/L 5 µg/L	
	total	DWS AgI/AgL	100 µg/L 1,000 µg/L	NA
Chromium III (Cr III)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	Standard varies by water hardness*, see published standards.	
	total	FC FBC/PBC	67,000 µg/L 140,000 µg/L	NA
Chromium VI (Cr VI)	dissolved	A&Wc/A&Ww/A&Wedw/ A&We	16 µg/L 34 µg/L	11 µg/L 23 µg/L
	total	FBC/PBC FC	700 µg/L 3,400 µg/L	NA
Copper (Cu)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	Standard varies by water hardness, see published standards.	
		DWS PBC/FBC	1,000 µg/L 5,200 µg/L	NA
	total	AgL AgI	500 µg/L 5,000 µg/L	NA
Cyanide (Cn)	total	A&Wc A&Ww/A&Wedw A&We AgL, DWS FBC/PBC FC	22 µg/L 41 µg/L 84 µg/L 200 µg/L 2,800 µg/L 210,000 µg/L	5.2 µg/L 9.7 µg/L 19 µg/L
Dissolved Oxygen (DO)		A&Ww A&Wc A&Wedw Applies 3 hours after sunrise to sunset Applies sunset to 3 hours after sunrise	>6.0 mg/L >7.0 mg/L >3.0 mg/L >1.0 mg/L	
		West Fork Little Colorado (Unique Waters) Peoples Canyon Creek (Unique Waters) Cienega Creek (Unique Waters) Bonita Creek (Unique Waters)	no decrease due to discharge	
Escherichia coli		FBC	30-day geometric mean (5 sample minimum) = 130 CFU/100ml single sample maximum = 580 CFU/100ml	
Fecal Coliform		A&Wedw	30-day geometric mean (5 sample minimum) = 200 CFU/100 ml 10% samples for a 30-day period = 400 CFU/100 ml single sample maximum = 800 CFU/100 ml	
		A&Ww/A&Wc/A&We/A&Wedw/DWS/PBC/AgI/AgL	30-day geo. mean (5 sample minimum) = 1,000 CFU/100 ml 10% samples for a 30-day period = 2,000 CFU/100 ml single sample maximum = 4,000 CFU/100 ml	
Fluoride or Fluorine (F)		DWS FBC/PBC	4 mg/L 8.4 mg/L	NA

SELECTED ARIZONA SURFACE WATER QUALITY NUMERIC STANDARDS (excluding VOCs, SOCs, and pesticides not used in this assessment)				
PARAMETER		**DESIGNATED USE(S)**	**STANDARD OR ASSESSMENT CRITERIA**	**CHRONIC STANDARDS**
Lead (Pb)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	Standard varies by water hardness, see published standards*.	
	total	DWS AgL AgI	50 µg/L 100 µg/L 10,000 µg/L	NA
Manganese (Mn)		DWS AgI FBC/PBC Unique Waters standards for: People's Canyon Creek, Burro Creek, and Francis Creek	4,900 µg/L 10,000 µg/L 19,600 µg/L 500 µg/L	NA
Mercury (Hg)	dissolved	A&Wc/A&Ww A&Wedw A&We	2.4 µg/L 2.6 µg/L 5.0 µg/L	0.01 µg/L 0.2 µg/L 2.7 µg/L
	total	FC DWS AgL FBC/PBC	0.6 µg/L 2 µg/L 10 µg/L 42 µg/L	NA
Nickel (Ni)	dissolved	A&W	Standard varies by water hardness, see published standards*.	
	total	DWS FC FBC/PBC	100 µg/L 730 µg/L 2,800 µg/L	
Nitrate (as nitrogen) (NO3)		DWS mean value San Pedro (Curtiss-Benson) FBC/PBC	10 mg/L 10 mg/L 224 mg/L	NA
Nitrate/Nitrite (as nitrogen) (NO3/NO2)		DWS	10 mg/L	
Nitrite (as nitrogen) (NO2)		DWS FBC/PBC	1 mg/L 14 mg/L	NA
Nitrogen (N)	total	See nutrient chart below		
pH		A&W/FBC/PBC/AgL DWS AgI All waters except Unique Waters Unique Water standards for: Bonita Creek, Cienega Creek, West Fork Little Colorado, Oak Creek, and West Fork Oak Creek	6.5 - 9.0 5.0 - 9.0 4.5 - 9.0 Maximum change due to discharge = 0.5 No change due to discharge	
Phosphorus (P)	total	See nutrient chart below		
Selenium (Se)	total	A&Ww/A&Wc AgL A&We A&Wedw AgL/DWS FBC/PBC FC	20 µg/L 20 µg/L 33 µg/L 50 µg/L 50 µg/L 700 µg/L 9,000 µg/L	2 µg/L NA 2 µg/L 2 µg/L NA NA NA

SELECTED ARIZONA SURFACE WATER QUALITY NUMERIC STANDARDS (excluding VOCs, SOCs, and pesticides not used in this assessment)				
PARAMETER		**DESIGNATED USE(S)**	**STANDARD OR ASSESSMENT CRITERIA**	**CHRONIC STANDARDS**
Silver (Ag)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	Standard varies by water hardness, see published standards*.	
	total	DWS (SMCL)	100 µg/L	NA
Sulfides (S2)		A&W	0.1 mg/L	NA
Temperature (maximum increase due to discharge)		A&Wc A&Ww/A&Wedw Unique Water standards for: Bonita Creek, Cienega Creek, West Fork Little Colorado, and People's Canyon	1.0 ° C 3.0 ° C no increase due to discharge	NA
Thallium (Tl)	dissolved	A&Wc/A&Ww/A&Wedw	700 µg/L	150 µg/L
	total	DWS FBC/PBC FC	2 µg/L 12 µg/L 41 µg/L	NA
Total Dissolved Solids (TDS)		DWS mg/L (SMCL) AgI (EPA criteria -- more sensative crops) AgI (EPA criteria -- less sensative crops)	500 mg/L 1000 mg/L 2000 mg/L	NA
		Unique Water standards for: West Fork Little Colorado River, Bonita Creek, & Cienega Creek	no increase due to discharge	NA
		Colorado River: below Hoover Dam below Parker Dam at Imperial Dam	NA	(flow-weighted average annual) 723 mg/L 747 mg/L 879 mg/L
Turbidity		A&Wc (streams & lakes) A&Wedw, A&Ww (lakes only) A&Ww, A&Wedw (streams only) Oak Creek (Unique Waters) Peoples Canyon Creek (Unique Waters) Cienega Creek (Unique Waters) Bonita Creek (Unique Waters)	10 NTU 25 NTU 50 NTU 3 NTU change due to discharge 5 NTU change due to discharge 10 NTU 15 NTU	NA
Uranium (Ur)	dissolved	DWS	35 µg/L	NA
Zinc (Zn)	dissolved	A&Ww/A&Wc/A&We/A&Wedw	Standard varies by water hardness*, see published standards.	
	total	DWS AgI FC AgL FBC/PBC	2,100 µg/L 10,000 µg/L 22,000 µg/L 25,000 µg/L 42,000 µg/L	NA

SURFACE WATER QUALITY STANDARDS FOR RADIOCHEMICALS		
Radiochemical	**Designated Use**	**Standard (mean value)**
Gross Alpha (excluding radon and uranium)	DWS	15 pCi/L
Radium-226 + Radium-228	DWS	5 pCi/L
Strontium 90	DWS	8 pCi/L
Tritium	DWS	20,000 pCi/L

SURFACE WATER QUALITY NUTRIENT STANDARDS			
WATERSHED OR SITE SPECIFIC LOCATION	**Annual Mean**	**90th Percentile**	**Single Sample Max**
Verde River and tributaries -- above Bartlett Lake	Phosphorus 0.10 mg/L Nitrogen 1.00 mg/L	Phosphorus 0.30 mg/L Nitrogen 1.50 mg/L	Phosphorus 1.00 mg/L Nitrogen 3.00 mg/L
Oak Creek including West Fork (in Verde Watershed) (Unique Waters standard)	Phosphorus 0.10 mg/L Nitrogen 1.00 mg/L	Phosphorus 0.25 mg/L Nitrogen 1.50 mg/L	Phosphorus 0.30 mg/L Nitrogen 2.50 mg/L
Black River, Tonto Creek and their tributaries (in Salt Watershed)	Phosphorus 0.10 mg/L Nitrogen 0.50 mg/L	Phosphorus 0.20 mg/L Nitrogen 1.00 mg/L	Phosphorus 0.80 mg/L Nitrogen 2.00 mg/L
Salt River and tributaries (except Pinal Creek) -- from confluence of Black and White to Roosevelt Lake	Phosphorus 0.12 mg/L Nitrogen 0.60 mg/L	Phosphorus 0.30 mg/L Nitrogen 1.20 mg/L	Phosphorus 1.00 mg/L Nitrogen 2.00 mg/L
Salt River -- below Stewart Mtn. Dam to confluence w/Verde River	Phosphorus 0.05 mg/L Nitrogen 0.60 mg/L	Phosphorus NNS Nitrogen NNS	Phosphorus 0.20 mg/L Nitrogen 3.00 mg/L
Roosevelt, Apache, Canyon, and Saguaro Lakes (composites at 2- and 5-meter depth)	Phosphorus 0.03 mg/L Nitrogen 0.30 mg/L	Phosphorus NNS Nitrogen NNS	Phosphorus 0.60 mg/L Nitrogen 1.00 mg/L (maximum of any set)
Little Colorado River and tributaries -- above River Reservoir. in Greer; So Fork LCR -- above South Fork Campground; and Water Canyon Creek --above USFS boundary	Phosphorus 0.08 mg/L Nitrogen 0.60 mg/L	Phosphorus 0.10 mg/L Nitrogen 0.75 mg/L	Phosphorus 0.75 mg/L Nitrogen 1.10 mg/L
Little Colorado River -- at Apache County Road No 124	Phosphorus NNS Nitrogen NNS	Phosphorus NNS Nitrogen NNS	Phosphorus 0.75 mg/L Nitrogen 1.80 mg/L
Little Colorado River -- from Amity Ditch diversion near AZ Hwy 273 to Lyman Lake (only when < 50 NTU)	Phosphorus 0.20 mg/L Nitrogen 0.70 mg/L	Phosphorus 0.30 mg/L Nitrogen 1.20 mg/L	Phosphorus 0.75 mg/L Nitrogen 1.50 mg/L
Colorado River -- at Mexico/US Northern International Border near Morales Dam	Phosphorus NNS Nitrogen NNS	Phosphorus 0.33 mg/L Nitrogen 2.50 mg/L	Phosphorus NNS Nitrogen NNS
San Pedro River -- from Curtis to Benson.	Phosphorus NNS Nitrogen NNS	Phosphorus NNS Nitrogen NNS	Phosphorus NNS Nitrate (as N) 10 mg/L

*Dissolved metal standards are calculated using equations published with the surface water standards (e.g., copper A&Wc acute standard: $e^{(0.9422\,[\ln(\text{hardness})]-1.464)}$. In these equations, hardness (expressed as $CaCO_3$) does not exceed 400 mg/L; therefore, use 400 mg/L hardness if result is greater than 400 mg/L.

Narrative Water Quality Standards

Narrative Surface Water Quality Standards

R18-11-108 -- A surface water shall be free from pollutants in amounts or combinations that:

- Settle to form bottom deposits that inhibit or prohibit the habitation, growth, or propagation of aquatic life or that impair recreational uses (bottom deposits standard);
- Cause objectionable odor in the area in which the surface water is located;
- Cause off-taste or odor in drinking water;
- Cause off-flavor in aquatic organisms or waterfowl;
- Are toxic to humans, animals, plants or other organisms (toxics standard);
- Cause the growth of algae or aquatic plants that inhibit or prohibit the habitation, growth, or propagation of other aquatic life or that impair recreational uses (narrative nutrient standard);
- Cause or contribute to a violation of an aquifer water quality standard prescribed in R18-11-405 or R18-11-406; or
- Change the color of the surface water from natural background levels of color.

A surface water shall be free from oil, grease, and other pollutants that float as debris, foam, or scum; or that cause a film or iridescent appearance on the surface of the water; or that cause a deposit on a shoreline, bank, or aquatic vegetation. The discharge of lubricating oil or gasoline associated with the normal operation of a recreational water-craft shall not be considered a violation of this narrative standard.

Narrative Aquifer Water Quality Standards

R18-11-405:

- A discharge shall not cause a pollutant to be present in an aquifer classified for a drinking water protected use in a concentration which endangers human health.
- A discharge shall not cause or contribute to a violation of a water quality standard established for a navigable water of the state.
- A discharge shall not cause a pollutant to be present in an aquifer which impairs existing or reasonably foreseeable uses of water in an aquifer.

Arizona's Numeric Aquifer Water Quality Standards

ARIZONA'S GROUND WATER STANDARDS FOR INORGANIC CHEMICALS	
CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	**AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)**
Antimony (Sb)	6
Arsenic (As)	50
Asbestos	7,000,000 fibers/Liter (longer than 10 µm)
Barium (Ba)	2000
Beryllium (Be)	4
Cadmium (Cd)	5
Chromium (total) (Cr)	100
Cyanide (Cn)	200 (as free cyanide)
Fluoride (F)	4 mg/L
Lead (Pb)	50
Mercury (Hg)	2
Nickel (Ni)	100
Nitrate (NO_3 as N)	10.0 mg/L
Nitrite (NO_2 as N)	1.0 mg/L
Nitrate + Nitrite (as N)	10 mg/L
Selenium (Se)	50
Thallium (Tl)	2

ARIZONA'S GROUND WATER STANDARDS FOR ORGANIC CHEMICALS, PESTICIDES, PETROLEUM HYDROCARBONS, AND POLYCHLORINATED BIPHENYL (PCBs)	
CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	**AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)**
Alachlor (Lasso)	2
Atrazine (Atranex, Crisazina)	3
Benzene	5
Benzo(a)pyrene	0.2
Carbofuran (Furadan 4F)	40
Carbon tetrachloride (Freon-10)	5
Chlordane	2
2,4-D (Formula 40, Weedar 64) 2,4-Dichlorophenoxyacetic Acid	70
Dalapon or 2.2-Dichloropropionic acid	200
Dibromochloromethane (DBCM or THM)	0.2
Dibromochloropropane (DBCP)	0.2
Dichlorobenzene (DCB)	o-DCB = 600 p-DCB = 75
Dichloroethane (DCA)	1,2-DCA = 5
Dichloroethylene or Dichloroethene (DCE)	1,1-DCE = 7 cis-1,2-DCE = 70 trans-1,2-DCE = 100
Dichloromethane	5
Dichloropropane	1,2-DCP = 5
Di(2-ethylhexyl)adipate (DOA)	400
Di(2-ethylhexyl)phthalate (DOP)	6
Dinoseb 2,4-Dinitro-6-sec-butyl-phenol (DNBP)	7
Dioxin 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.00003

ARIZONA'S GROUND WATER STANDARDS FOR ORGANIC CHEMICALS, PESTICIDES, PETROLEUM HYDROCARBONS, AND POLYCHLORINATED BIPHENYL (PCBs)	
CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	**AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)**
Diquat or Dihydrodipyrido-pyrazidinium salt	20
Endothall or Oxalobicyclo-heptane-dicarbooxylic acid disodium salt	100
Endrin or Hexachloroepoxyoctahydro-endo-dimethanonaphthalene	2
Ethylene dibromide (EDB)	0.05
Ethylbenzene (ETB)	700
Glyphosate or N-(phosphonomethyl)glycine	700
Heptachlor	0.4
Heptachlor epoxide	0.2
Hexachlorobenzene or Perchlorobenzene	1
Hexachlorocyclopentadiene or Perchlorocyclopentadiene	50
Lindane or gamma-Benzene hexachloride	0.2
Methoxychlor (Methoxy DDT, DMDT)	40
Monochlorobenzene, or Chlorobenzene, or Phenyl chloride	100
Oxamyl	200
Perchloroethylene (PCE), Tetrachloroethylene or Tetrachloroethene	5
Pentachlorophenol	1
Picloram	500
Polychlorinated biphenyl (PCB)	0.5
Silvex 2-(2,4,5-Trichlorophenoxy)propionic acid	50
Simazine 2-Chloro-4.6-bis(ethylamino)-2-triazine	4
Styrene	100

ARIZONA'S GROUND WATER STANDARDS FOR ORGANIC CHEMICALS, PESTICIDES, PETROLEUM HYDROCARBONS, AND POLYCHLORINATED BIPHENYL (PCBs)	
CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	**AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)**
1,2,4-Trichlorobenzene	70
Trichloroethane (TCA)	1,1,1-TCA = 200 1,1,2-TCA = 5
Trichloroethylene or Trichloroethene (TCE)	5
Toluene (TOL)	1000
Toxaphene	3
Vinyl chloride (VC)	2
Xylene (XYL)	10,000

ARIZONA'S GROUND WATER STANDARDS FOR RADIOCHEMICALS, PHYSICAL MEASUREMENTS, AND BACTERIA	
CONTAMINANT NAME (ABBREVIATION, TRADE OR GENERIC NAME)	**AQUIFER WATER QUALITY STANDARDS (µg/L unless stated)**
Beta particle + photon human-caused radionuclides	4 millirem/year
Gross alpha (include Radium-226, exclude radon and uranium)	15 pCi/L
Radium-226 + Radium-228	5 pCi/L
Strontium-90	4 millirem/year 8 pCi/L in bone marrow
Tritium	4 millirem/year 20,000 pCi/L in total body
Total coliform	0 per 100 ml
Turbidity	1 NTU monthly mean, 5 NTU (if 0 fecal coliform after chlorination), 5 NTU (2-day mean)

Surface water and aquifer protection standards are published in Arizona Administrative Code Title 18, Chapter 11 (R18-11-101 through R18-11-506).

APPENDIX D. FIVE-PART ASSESSMENT LIST

PART 1. SURFACE WATERS ASSESSED AS ATTAINING ALL USES (All uses assessed as "attaining")		
Surface Water Name Segment Description	**Waterbody ID**	**Pollutants of Concern (Number of Samples Exceeding Standards)**
Bill Williams Watershed		
Big Sandy River Sycamore-Burro Creek	AZ15030201-004	none
Burro Creek Boulder-Black Canyon	AZ15030202-004	none
Santa Maria River South Fork-Bridle	AZ15030203-010	none
Trout Creek Cow Creek-Knight Creek	AZ15030201-014	none
Colorado - Grand Canyon Watershed		
Colorado River Lake Powell-Paria River	AZ14070006-001	none
Paria River Utah border-Colorado River	AZ14070007-123	none
Colorado - Lower Gila Watershed		
Colorado River Bill Williams River- Osborne Wash	AZ15030104-020	none
Colorado River Main Canal-Mexico border	AZ15030107-001	none
Lake Havasu, except London Bridge Beach in Thompson Bay	AZ15030101-0590A	none
Lake Havasu at London Bridge Beach in Thompson Bay	AZ15030101-0590B	none
Little Colorado River - San Juan Watershed		
West Fork Little Colorado River Government Springs-Little Colorado River	AZ15020001-013B	none
Middle Gila Watershed		
Salt Watershed		
Pinal Creek Jesse Lane - Salt River	AZ15060103-280D	none
Pinto Creek Ripper Spring-Roosevelt Lake	AZ15060103-018B	none
Salt River Pinal Creek-Roosevelt Lake	AZ15060103-022	none
Salt River Saguaro Lake-Verde River	AZ15060106A-003	none
San Pedro - Willcox Playa - Rio Yaqui Watershed		
Arivaipa Canyon Creek Stowe Gulch-Wilderness boundary	AZ15050203-004B	none
Bass Canyon Creek headwaters-Hot Springs Canyon	AZ15050203-899	none

PART 1. SURFACE WATERS ASSESSED AS ATTAINING ALL USES
(All uses assessed as "attaining")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern (Number of Samples Exceeding Standards)
Copper Creek headwaters-Prospect Canyon	AZ15050203-022A	none
Hot Springs Canyon Creek headwaters-San Pedro River	AZ15050203-013	none
Ramsey Canyon Creek headwaters-San Pedro River	AZ15050202-404	none
Rucker Canyon Creek headwaters-Whitewater Draw	AZ15080301-288	none
Santa Cruz - Rio Magdalena - Rio Sonoyta Watershed		
Upper Gila Watershed		
Blue River New Mexico border-KP Creek	AZ15040004-026	none
Blue River KP Creek-San Francisco River	AZ15040004-025	none
Bonita Creek Park Creek-Gila River	AZ15040005-030	none
Campbell Blue Creek headwaters-Blue River	AZ15040004-028	none
Cave Creek headwaters-USFS boundary	AZ15040006-852A	none
Cave Creek USFS boundary-New Mexico boundary	AZ15040006-852B	none
Eagle Creek headwaters-Willow Creek	AZ15040005-028	none
Fry Creek headwaters-Highline Canal	AZ15040005-988	none
South Fork Cave Creek headwaters-Cave Creek	AZ15040005-849	none
Verde River Watershed		
East Verde River American Gulch-Verde River	AZ15060203-022B	none
Verde River Sycamore Creek-Oak Creek	AZ15060202-025	none (Note that a turbidity TMDL was approved for this reach in 2002.)

PART 2. SURFACE WATERS ASSESSED AS ATTAINING SOME USES
(These surface waters are placed on the Planning List)
(All uses are "attaining," "threatened," or "inconclusive")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern (Number of Samples Exceeding Standards)
Bill Williams Watershed		
Bill Williams River B-Colorado River	AZ15030204-001	Missing core parameters.
Boulder Creek Coppar Creek-Burro Creek	AZ15030202-005B	Missing core parameters.
Burro Creek Francis Creek-Boulder Creek	AZ15030202-008	Turbidity exceeded standards in 3 of 10 samples. Missing core parameters.
Butte Creek Headwaters-Burro Creek	AZ15030202-163	Missing core parameters.
Wilder Creek headwaters-Boulder Creek	AZ15030202-007	Missing core parameters.
Colorado - Grand Canyon Watershed		
Colorado - Lower Gila Watershed		
Colorado River Hoover Dam- Lake Mohave	AZ15030101-015	Missing core parameters.
Colorado River Indian Wash-Imperial Dam	AZ15030104-001	Missing core parameters.
Little Colorado River - San Juan Watershed		
Billy Creek headwaters-Show Low Creek	AZ15020005-019	Missing core parameters.
Clear Creek Reservoir	AZL15020008-0340	Missing core paremeters. Use lower mercury laboratory detection limit.
Cholla Lake	AZL15020008-0320	Missing core parameters. Use lower mercury laboratory detection limit.
Little Colorado River Water Canyon-Nutrioso Creek	AZ15020001-010	Turbidity exceeded standards in 5 out of 6 samples.
Little Colorado River Nutrioso Creek-Carnero Wash	AZ15020001-009	Turbidity exceeded standards in 5 out of 7 samples.
Little Colorado River Silver Creek-Carr Wash	AZ15020002-004	Beryllium exceeded standards in 3 of 3 samples. Turbidity exceeded standards in 7 of 12 samples. Fecal coliform exceeded standards in 1 of 7 samples.
Porter Creek headwaters-Show Low Creek	AZ15020005-246	Missing core parameters.
Show Low Creek headwaters-Linden Wash	AZ15020005-012	Missing core parameters. Turbidity exceeded standards in 15 of 16 samples.
Walnut Creek Pine Lake - Rainbow Lake	AZ15020005-238	Missing core parameters.
Willow Creek headwaters-East Clear Creek	AZ15020008-011	Missing core parameters. Use lower mercury laboratory detection limit.
Middle Gila Watershed		
Alvord Park Lake	AZL15060106B-0050	Missing bacteria samples. Beryllium exceeded standards in 1 of 1 sample.
Chaparral Lake	AZL15060106B-0300	Missing bacteria samples. pH exceeded standards in 3 of 12 samples.

PART 2. SURFACE WATERS ASSESSED AS ATTAINING SOME USES
(These surface waters are placed on the Planning List)
(All uses are "attaining," "threatened," or "inconclusive")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern (Number of Samples Exceeding Standards)
Cortez Park Lake	AZL15060106B-0410	Missing bacteria samples. pH exceeded standards in 6 of 12 samples. Fish kill may indicate narrative nutrient standard violation.
Hassayampa River Copper Creek-Blind Indian Creek	AZ15070103-007B	Beryllium exceeded standards in 1 of 1 sample. Need lower laboratory detection limit. Fecal coliform exceeded standards in 1 of 8 samples.
Hassayampa River Cottonwood Creek-Martinez Wash	AZ15070103-004	Arsenic exceeded standards in 1 of 7 samples. Beryllium exceeded standards in 2 of 2 samples. Need lower laboratory detection limit. Copper exceeded standards in 1 of 7 samples. Escherichia coli exceeded standards in 1 of 6 samples. Lead exceeded standards in 1 of 7 samples. Turbidity exceeded standards in 2 of 7 samples.
Lynx Lake	AZL15070102-0860	Missing core parameters.
Salt Watershed		
Saguaro Lake	AZL15060106A-1290	Missing core parameters.
Spring Creek headwaters-Tonto Creek	AZ15060105-010	Missing core parameters.
San Pedro - Willcox Playa - Rio Yaqui Watershed		
Buehman Canyon headwaters-end of Unique Waters	AZ15050203-010A	Beryllium exceeded standards in 8 of 8 samples.
Double R Canyon Creek headwaters-Bass Canyon Creek	AZ15050203-902	Missing bacteria samples. Dissolved oxygen did not meet standards in 2 of 3 samples.
Grant Creek headwaters-High Creek	AZ15050201-033	Missing 1 bacteria sample. Missing fluoride samples.
San Pedro River Mexico border-Charleston	AZ15050202-008	Beryllium exceeded standards in 1 of 1 sample.
San Pedro River Charleston-Walnut Gulch	AZ15050202-006	Turbidity exceeded standards in 1 of 4 samples.
San Pedro River Babocomari Creek-Dragoon Wash	AZ15050202-003	Escherichia coli exceeded standards in 1 of 4 samples. Fecal coliform exceeded standards in 1 of 4 samples. Turbidity exceeded standards in 3 of 14 samples.
San Pedro River Hot Springs Canyon Creek-Redfield Canyon	AZ15050203-011	Escherichia coli did not meet standards in 1 of 4 samples. Fecal coliform exceeded standards in 1 of 4 samples. Turbidity exceeded standards in 1 of 5 samples.
San Pedro River Aravaipa Creek-Gila River	AZ15050203-001	Escherichia coli exceeded standards in 1 of 4 samples. Turbidity exceeded standards in 1 of 6 samples.
Whitewater Draw Mule Gulch-Mexico border	AZ15080301-002	Missing core parameters. Insufficient sampling events.
Santa Cruz - Rio Magdalena - Rio Sonoyta Watershed		
Kennedy Lake	AZL15050302-0720	Missing core parameters.
Lakeside Lake	AZL15050302-0760	Missing core parameters. Dissolved oxygen did not meet standards in 4 of 16 samples. Fish kills may indicate narrative nutrient standard violation.
Parker Canyon Lake	AZL15050301-1040	Missing core parameters

PART 2. SURFACE WATERS ASSESSED AS ATTAINING SOME USES
(These surface waters are placed on the Planning List)
(All uses are "attaining," "threatened," or "inconclusive")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern (Number of Samples Exceeding Standards)
Patagonia Lake	AZL15050301-1050	Missing core parameters. Dissolved oxygen did not meet standards in 1 of 4 samples.
Sonoita Creek 750 feet below Sonoita WWTP-Santa Cruz River	AZ15050301-013C	Missing core parameters.
Upper Gila Watershed		
Ash Creek headwaters-Gila River	AZ15040005-040	Dissolved oxygen did not meet standards in 1 of 3 samples.
Dankworth Ponds	AZL15040005-0440	Missing bacteria samples.
Eagle Creek Willow Creek-Sheep Wash	AZ15040005-027	Turbidity exceeded standards in 1 of 4 samples.
Eagle Creek Sheep Wash-Gila River	AZ15040005-025	Turbidity exceeded standards in 3 of 10 samples.
Gila River Skully Creek-San Francisco River	AZ15040002-001	Turbidity exceeded standards in 6 of 10 samples.
Gila River San Francisco River-Eagle Creek	AZ15040005-024	Turbidity exceeded standards in 12 of 12 samples.
Gila River Eagle Creek-Bonita Creek	AZ15040005-023	Turbidity exceeded standards in 9 of 12 samples.
Roper Lake	AZL15040005-1250	Missing bacteria samples.
San Francisco River headwaters-New Mexico border	AZ15040004-023	Turbidity exceeded standards in 7 of 8 samples.
San Francisco River Blue River-Limestone Gulch	AZ15040004-003	Turbidity exceeded standards in 4 of 11 samples. Beryllium exceeded standards in 1 of 1 sample.
Verde River Watershed		
Bartlett Lake	AZL15060203-0110	Missing bacteria samples.
East Verde River headwaters-American Gulch	AZ15060203-022A	Turbidity exceeded standards in 7 of 14 samples.
Granite Basin Lake	AZL15060202-0580	Missing core parameters. Dissolved oxygen did not meet standards in 3 of 7 samples. pH did not meet standards in 1 of 8 samples.
Oak Creek headwaters-West Fork Oak Creek	AZ15060202-019	Turbidity exceeded standards in 1 of 9 samples. Missing core parameters.
Oak Creek Dry Creek-Spring Creek	AZ15060202-017	Turbidity exceeded standards in 3 of 4 samples.
Pumphouse Wash headwaters-Oak Creek	AZ15060202-442	Missing core parameters.
Spring Creek Coffee Creek-Oak Creek	AZ15060202-022	Missing bacteria samples.
Sycamore Creek Tule Canyon-Cedar Creek	AZ15060202-026	Missing bacteria samples.
Verde River West Clear Creek - Fossil Creek	AZ15060203-025	Turbidity exceeded standards in 4 of 9 samples. Escherichia coli exceeded standards in 1 of 9 samples.

PART 2. SURFACE WATERS ASSESSED AS ATTAINING SOME USES (These surface waters are placed on the Planning List) (All uses are "attaining," "threatened," or "inconclusive")		
Surface Water Name Segment Description	**Waterbody ID**	**Pollutants of Concern (Number of Samples Exceeding Standards)**
Verde River Tangle Creek-Ister Flat	AZ15060203-018	Turbidity exceeded standards in 4 of 21 samples. Missing bacteria samples.
Verde River Bartlett Dam-Camp Creek	AZ15060203-004	Missing bacteria samples.
West Clear Creek headwaters-Verde River	AZ15060203-026	Missing bacteria samples.
Whitehorse Lake 41 acres AZL15060202-1630	AZL15060202-1630	Fish kill may indicate narrative nutrient violation. Low dissolved oxygen in 5 out of 11 samples. High pH readings in 3 out of 12 samples. Missing bacteria samples.

PART 3. SURFACE WATERS WITH INSUFFICIENT DATA TO ASSESS
(These surface waters are placed on the Planning List)
(All uses assessed as "inconclusive")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern (Number of Samples Exceeding Standards)
Bill Williams Watershed		
Big Sandy River Deluge Wash-Tule Wash	AZ15030201-011	Missing core parameters
Big Sandy River Rupley Wash-Alamo Lake	AZ15030201-001	
Francis Creek headwaters-Burro Creek	AZ15030202-012	Insufficient current data to assess.
Colorado - Grand Canyon Watershed		
Beaver Dam Wash Utah border-Virgin River	AZ15010010-009	Insufficient sampling events.
Boucher Creek California border-Colorado River	AZ15010002-017	Lack of current data that meets credible data requirements and missing core parameters.
Chuar (Lava) Creek headwaters-Colorado River	AZ15010001-024	Lack of current data that meets credible data requirements and missing core parameters. (Turbidity exceeded standards in 2 of 2 samples.)
Clear Creek headwaters-Colorado River	AZ15010001-025	Lack of current data that meets credible data requirements and missing core parameters.
Crystal Creek headwaters-Colorado River	AZ15010002-018	Lack of current data that meets credible data requirements and missing core parameters.
Deer Creek headwaters- Colorado River	AZ15010002-019	Lack of current data that meets credible data requirements and missing core parameters.
Garden Creek headwaters-Colorado River	AZ15010002-841	Lack of current data that meets credible data requirements and missing core parameters.
Havasu Creek Little Coyote-Colorado River	AZ15010004-001	Lack of current data. (Turbidity exceeded standards in 2 of 10 samples in older data.)
Hermit Creek headwaters-Colorado River	AZ15010002-020	Lack of current data that meets credible data requirements and missing core parameters.
Kwagunt Creek headwaters-Colorado River	AZ15010001-031	Lack of current data that meets credible data requirements and missing core parameters. (Turbidity exceeded standards in 1 of 4 samples)
Lake Powell	AZL14070006-1130	Lack of current data that meets credible data requirements and missing core parameters.
Monument Creek headwaters-Colorado River	AZ15010002-845	Lack of current data that meets credible data requirements and missing core parameters.
Nankoweap Creek headwaters-Colorado River	AZ15010001-033	Lack of current data that meets credible data requirements and missing core parameters. (Turbidity exceeded standards in 1 of 5 samples)
National Canyon Creek headwaters-Colorado River	AZ15010002-016	Lack of current data that meets credible data requirements and missing core parameters.
Royal Arch Creek headwaters-Colorado River	AZ15010002-871	Lack of current data that meets credible data requirements and missing core parameters.
Saddle Canyon Creek headwaters-Colorado River	AZ15010002-703	Lack of current data that meets credible data requirements and missing core parameters.
Shinumo Creek headwaters-Colorado River	AZ15010002-029	Lack of current data that meets credible data requirements and missing core parameters.
Spring Canyon Creek headwaters-Colorado River	AZ15010002-318	Lack of current data that meets credible data requirements and missing core parameters.

PART 3. SURFACE WATERS WITH INSUFFICIENT DATA TO ASSESS
(These surface waters are placed on the Planning List)
(All uses assessed as "inconclusive")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern (Number of Samples Exceeding Standards)
Tapeats Creek headwaters-Colorado River	AZ15010002-696	Lack of current data that meets credible data requirements and missing core parameters.
Three Springs Creek headwaters-Colorado River	AZ15010002-1180	Lack of current data that meets credible data requirements and missing core parameters.
Vasey's Paradise (Spring) at Colorado River	AZ15010001-SP01	Lack of current data that meets credible data requirements and missing core parameters.
Colorado-Lower Gila Watershed		
Gila River Coyote Wash-Fortuna Wash	AZ15070201-003	Boron exceeded standards in 4 of 20 samples.
Lake Mohave	AZL15030101-0960	Missing core parameters.
Little Colorado River - San Juan Watershed		
Barbershop Canyon Creek headwaters-East Clear Creek	AZ15020008-537	Missing core parameters. Need more sampling events.
Buck Springs Canyon Creek headwaters-Leonard Canyon	AZ15020008-557	Turbidity exceeded standards in 1 of 1 sample. pH did not meet standards in 1 of 1 sample. Need more sampling events.
Chevelon Creek headwaters-West Chevelon Creek	AZ15020010-006	Missing core parameters. Dissolved oxygen insufficient in 1 of 6 samples.
Chevelon Creek Black Canyon - Little Colorado River	AZ15020010-001	Turbidity exceeded standards in 11 of 18 samples.
Hall Creek headwaters-Little Colorado River	AZ15020001-012	Dissolved oxygen insufficient in 1 of 1 sample. Need more sampling events.
Lake Mary (upper)	AZL15020015-0900	Indications of a narrative toxic standard violation based on mercury fish consumption advisory. Insufficient water chemistry monitoring data.
Lake Mary (lower)	AZL15020015-0890	Indications of a narrative toxic standard violation based on mercury fish consumption advisory. Insufficient water chemistry monitoring data.
Lee Valley Reservoir	AZL15020001-0770	Missing core parameters. pH not meeting standards in 2 of 4 samples. Use lower mercury laboratory detection level.
Long Lake (lower)	AZL15020008-0820	Missing core parameters. Lack of seasonal representation.
Lyman lake	AZL15020001-0850	Missing core parameters. Lack of seasonal representation.
McKay Reservoir	AZL15020001-0007	Need more sampling events. Dissolved oxygen insufficient in 1 of 1 sample. pH did not meet standard in 1 of 1 sample.
Nelson Reservoir	AZL15020001-1000	Missing core parameters. Insufficient sampling events.
Silver Creek headwaters-Show Low Creek	AZ15020005-013	Missing core parameters.
Silver Creek Seven Mile Draw-Little Colorado River	AZ15020005-001	Turbidity exceeded standards in 13 of 13 samples.
West Fork of the Little Colorado River headwaters-Government Springs	AZ15020001-013A	Insufficient sampling events.

PART 3. SURFACE WATERS WITH INSUFFICIENT DATA TO ASSESS
(These surface waters are placed on the Planning List)
(All uses assessed as "inconclusive")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern (Number of Samples Exceeding Standards)
Willow Spring Creek headwaters-Chevelon Creek	AZ15020010-240	Missing core parameters. Insufficient sampling events.
Woods Canyon Creek headwaters-Chevelon Creek	AZ15020010-084	Missing core parameters. Insufficient sampling events. Dissolved oxygen insufficient in 1 of 2 samples.
Woods Canyon Lake	AZL15020010-1700	Insufficient sampling events. pH did not meet standards in 1 of 1 sample.
Middle Gila Watershed		
Agua Fria River Big Bug-Squaw Creek	AZ15070102-023	Turbidity exceeded standards in 3 of 17 samples.
Arizona Canal below last WTP intake	AZ15060106B-099B	Missing core parameters.
Arizona Canal Granite Reef Dam-last WTP intake	AZ15060106A-099A	Missing core parameters.
Buckeye Canal	AZ15070103-090	Missing core parameters. DDE exceeded standards in 1 of 1 sample.
Consolidated Canal Above last WTP intake	AZ15050100-074A	Missing core parameters.
Dripping Spring Wash headwaters-Gila River	AZ15050100-011	Missing core parameters. Mercury laboratory detection limit needs to be lower.
Eastern Canal Below last WTP intake	AZ15050100-207B	Missing core parameters.
Eastern Canal Above last WTP intake	AZ15050100-207B	Missing core parameters.
Fain Lake	AZL15071010-0005	Missing core parameters. Mercury laboratory detection limit needs to be lower to assess Fish Consumption.
Galena Gulch headwaters-Agua Fria River	AZ15070102-745	Insufficient credible data to meet current listing requirements (cyanide).
Gila River Dripping Spring-San Pedro River	AZ15050100-009	Missing core parameters. Mercury laboratory detection limit needs to be lower.
Gila River San Pedro River-Mineral Creek	AZ15050100-008	Missing core parameters. Turbidity exceeded standards in 2 of 3 samples. Mercury laboratory detection limit needs to be lower.
Gila River Mineral Creek-Donnelly Wash	AZ15050100-007	Insufficient current data. Original 303(d) Listing data for copper and turbidity related to a mine spill that has subsequently been cleaned up.
Gila River Ashurst-Hayden-Florence WWTP	AZ15050100-003B	Missing core parameters. Insufficient sampling events. Copper exceeded standards in 1 of 2 samples.
Gila River Salt River-Agua Fria River	AZ15070101-015	Fish advisory due to DDT metabolites, toxaphene, dieldrin and chlodane in fish tissue may indicate a narrative toxic standard violation. Missing core parameters.
Gila River Agua Fria River-Waterman Wash	AZ15070101-014	Fish advisory due to DDT metabolites, toxaphene, dieldrin and chlodane in fish tissue may indicate a narrative toxic standard violation. Missing core parameters.

PART 3. SURFACE WATERS WITH INSUFFICIENT DATA TO ASSESS
(These surface waters are placed on the Planning List)
(All uses assessed as "Inconclusive")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern (Number of Samples Exceeding Standards)
Gila River Waterman Wash-Hassayampa River	AZ15070101-010	Fish advisory due to DDT metabolites, toxaphene, dieldrin and chlodane in fish tissue may indicate a narrative toxic standard violation. Missing core parameters.
Gila River Hassayampa River-Centennial Wash	AZ15070101-009	Fish advisory due to DDT metabolites, toxaphene, dieldrin and chlodane in fish tissue may indicate a narrative toxic standard violation. Missing core parameters.
Gila River Gillespie Dam-Rainbow Wash	AZ15070101-007	Fish advisory due to DDT metabolites, toxaphene, dieldrin and chlodane in fish tissue may indicate a narrative toxic standard violation. Missing core parameters
Gila River Rainbow Wash-Sand Tank	AZ15070101-005	Fish advisory due to DDT metabolites, toxaphene, dieldrin and chlodane in fish tissue may indicate a narrative toxic standard violation. Missing core parameters.
Gila River Sand Tank-Painted Rocks Reservoir	AZ15070101-001	Fish advisory due to DDT metabolites, toxaphene, dieldrin and chlodane in fish tissue may indicate a narrative toxic standard violation. Missing core parameters.
Grand Canal	AZ15070103-250	Missing core parameters
Hassayampa River Buckeye Canal-Gila River	AZ15070103-001B	Fish advisory due to DDT metabolites, toxaphene, dieldrin and chlodane in fish tissue may indicate a narrative toxic standard violation. Missing core parameters
Lake Pleasant	AZL15070102-1100	Missing core parameters. Fish kill due to re-suspended solids may indicate a violation of the narrative bottom deposits standard.
Lynx Creek headwaters-Agua Fria River	AZ15070103-033	Insufficient sampling events. Cadmium exceeded standards in 1 of 1 sample. Copper exceeded standards in 1 of 1 sample. Missing core parameters.
Mineral Creek headwaters-Devils Canyon	AZ15050100-012A	Insufficient sampling events to assess. (Reach was split for assessment. Lower portion, AZ15050100-012B, is on Part 5 of this list. All current monitoring data has been collected in that lower segment.)
Painted Rock Reservoir	AZL15070101-1020	Fish advisory due to DDT metabolites, toxaphene, dieldrin and chlodane in fish tissue may indicate a narrative toxic standard violation. Missing core parameters.
Papago Park Ponds	AZL15060106B-1030	Missing bacteria samples.
Queen Creek Superior Mine WWTP-Potts Canyon	AZ15050100-014B	Missing core parameters
Salt River 23rd Ave WWTP-Gila River	AZ15060106B-001D	Fish advisory due to DDT metabolites, toxaphene, dieldrin and chlodane in fish tissue may indicate a narrative toxic standard violation. Missing core parameters.
South Canal	AZ15060106B-180	Missing core parameters.
Tempe Canal	AZ15050100-115	Missing core parameters.
Western Canal	AZ15060106B-262	Missing core parameters
Western Canal	AZ15050100-990	Missing core parameters
Salt Watershed		
Apache Lake	AZL15060106A-0070	Missing core parameters.
Beaver Creek headwaters-Black River	AZ15060101-008	Insufficient sampling events. Turbidity exceeded standards in 2 of 4 samples.

PART 3. SURFACE WATERS WITH INSUFFICIENT DATA TO ASSESS
(These surface waters are placed on the Planning List)
(All uses assessed as "inconclusive")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern (Number of Samples Exceeding Standards)
Big Lake	AZL15060101-0160	Missing core parameters.
Bloody Tanks Wash Schultz Ranch-Miami Wash	AZ15060103-034B	Copper exceeds standards on one event. Insufficient sampling events.
Canyon Creek headwaters-Oak Creek	AZ15060103-014	Insufficient sampling events to assess.
Cherry Creek headwaters-Salt River	AZ15060103-015	Missing core parameters. Insufficient sampling events.
Crescent Lake	AZL15060101-0420	Missing core parameters. pH did not meet standards in 6 of 8 samples.
Fish Creek headwaters-Black River	AZ15060101-032	Insufficient sampling events. Dissolved copper did not meet standard in 1 of 1 sample.
Haunted Canyon headwaters-Pinto Creek	AZ15060103-879	Insufficient sampling events. Missing core parameters.
Lake Sierra Blanca	AZL15060101-1390	Fish kill in 1998 related to weed growth and subsequent high pH may indicate a narrative nutrient standard violation.
Roosevelt Lake	AZL15060103-1240	Missing core parameters.
West Fork Black River headwaters-Black River	AZ15060101-048	Turbidity exceeded standards in 2 of 4 samples.
San Pedro - Willcox Playa - Rio Yaqui Watershed		
Arivaipa Canyon Creek Wilderness boundary-San Pedro River	AZ15050203-004C	Missing bacteria samples. Insufficient sampling events.
Hendricks Gulch headwaters-Mule Gulch	AZ15080301-335	Missing core parameters. Copper exceeded standards in 1 of 3 samples. pH did not meet standards in 1 of 3 samples. (Address as part of Mule Gulch TMDL.)
Rigs Flat Lake	AZL15050201-1210	Missing core parameters. Turbidity exceeded standards in 1 of 1 sample.
Snow Flake Lake	AZL15050201-1420	Missing core parameters.
Winwood Canyon headwaters-Mule Gulch	AZ15080301-340	Copper exceeded standards in 1 of 2 samples pH did not meet standards in 1 of 2 samples Insufficient sampling events and missing core parameters. (Address as part of Mule Gulch TMDL.)
Santa Cruz - Rio Magdalena - Rio Sonoyta Watershed		
Cienega Creek headwaters - Interstate-10	AZ15050302-006A	Insufficient sampling events and seasonal coverage. Missing bacteria samples.
Cienega Creek Interstate-10 - Del Lago Dam	AZ15050302-006B	Insufficient sampling events and seasonal coverage. Missing bacteria samples.
Endless Mine tributary (unnamed tributary) headwaters-Harshaw Creek	AZ15050301-888	Missing core parameters. pH did not meet standards in 3 of 3 samples. (Address as part of Harshaw Creek TMDL.)
Humboldt Canyon headwaters-Alum Gulch	AZ15050301-340	Missing core parameters. Copper exceeded standards during 1 sampling event (2 sites). Zinc exceeded standard during 1 sampling event (2 sites). pH did not meet standards during one sampling event (2 sites). (Address as part of Alum Gulch TMDL.)

PART 3. SURFACE WATERS WITH INSUFFICIENT DATA TO ASSESS
(These surface waters are placed on the Planning List)
(All uses assessed as "inconclusive")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern (Number of Samples Exceeding Standards)
Pena Blanca Canyon Creek Mexico border-Pena Blanca Lake	AZ15050301-808	Missing core parameters. Insufficient monitoring events.
Rose Canyon Lake	AZL15050302-1260	Missing core parameters. Insufficient monitoring events. pH did not meet standards in 1 of 1 sample Turbidity exceeded standards in 1 of 1 sample.
Sabino Canyon Creek headwaters-Tanque Verde	AZ15050302-014	Insufficient sampling events and core parameters. Dissolved oxygen did not meet standards in 1 of 1 sample.
Santa Cruz River Canada del Oro-Guild Wash	AZ15050301-001	Missing bacteria samples. Dissolved oxygen did not meet standards in 6 of 12 samples.
Sonoita Creek headwaters-1 kilometer below Highway-82	AZ15050301-013A	Missing core parameters.
Unnamed tributary to Three R Canyon headwaters-Three R Canyon	AZ15050301-xxx	pH did not meet standards in 1 of 1 sample Copper exceeded standards in 1 of 1 sample Zinc exceeded standards in 1 of 1 sample Missing core parameters and insufficient data to assess. (Address as part of the Three R Canyon TMDL.)
Upper Gila Watershed		
Gila River New Mexico border-Bitter Creek	AZ15040002-004	Insufficient samples to assess in Arizona. (Turbidity exceeded standards just across border in New Mexico.)
K P Creek headwaters-Blue River	AZ15040004-029	Missing core parameters.
San Francisco River New Mexico border-Blue River	AZ15040004-004	Missing core parameters. Turbidity exceeded standards in 1 of 4 samples.
Verde River Watershed		
Apache Creek headwaters-Walnut Creek	AZ15060201-019	Insufficient sampling events.
Bitter Creek Jerome WWTP-2.5 miles below	AZ15060202-066B	Insufficient sampling events.
Unnamed tributary to Bitter Creek headwaters-Bitter Creek	AZ15060202-868	Insufficient sampling events. Cadmium, copper, zinc, and pH did not meet standards during 2 sampling events in 1991. No current data.
Ellison Creek headwaters-East Verde River	AZ15060203-459	Insufficient sampling events. Missing bacteria samples.
Fossil Creek headwaters-Verde River	AZ15060203-024	Insufficient sampling events.
Granite Creek headwaters-15060202-060	AZ15060202-059	Escherichia coli exceeded standards twice, but exceedances were 5 years apart. Beryllium exceeded standards in 1 of 6 samples. Turbidity exceeded standards in 1 of 2 samples. Missing core parameters.
Green Valley Lake	AZL15060203-0015	Insufficient sampling events. Missing core parameters.
Horseshoe Reservoir	AZL15060203-0620	Insufficient sampling events. Dissolved oxygen did not meet standards in 1 of 1 sample.
Munds Creek headwaters-Oak Creek	AZ15060202-415	Missing core parameters and seasonal representation.

PART 3. SURFACE WATERS WITH INSUFFICIENT DATA TO ASSESS
(These surface waters are placed on the Planning List)
(All uses assessed as "inconclusive")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern (Number of Samples Exceeding Standards)
Oak Creek Spring Creek-Verde River	AZ15060202-016	Turbidity exceeded standards in 1 of 2 samples. Insufficient sampling events. Missing core parameters.
Pine Creek headwaters-East Verde River	AZ15060203-049	Insufficient sampling events.
Roundtree Creek headwaters-Tangle Creek	AZ15060203-853	Insufficient sampling events.
Sycamore Creek headwaters-Verde River	AZ15060203-055	Insufficient sampling events.
Verde River Granite Creek-Hell Canyon	AZ15060202-052	Insufficient sampling events.
Verde River Hell Canyon-15060202-065	AZ15060202-038	Insufficient sampling events.
Verde River Oak Creek-Beaver Creek	AZ15060202-015	Insufficient sampling events.
Webber Creek headwaters-East Verde River	AZ15060203-058	Insufficient sampling events.
West Fork Oak Creek headwaters-Oak Creek	AZ15060202-020	Insufficient sampling events.
Wet Beaver Creek Long Canyon Creek-Rarick Wash	AZ15060202-004	Missing core parameters. Dissolved oxygen did not meet standards in 2 of 7 samples.
Wet Bottom Creek headwaters-Verde River	AZ15060203-020	Missing core parameters. Insufficient sampling events.

PART 4. SURFACE WATERS ASSESSED NOT ATTAINING
(These surface waters are placed on the Planning List)
(At least one use assessed as "not attaining" and no uses assessed as "impaired")

Surface Water Name* Segment Description	Waterbody ID	Pollutants of Concern (Other problems to investigate)	Applicable Section of Part 4
Bill Williams Watershed			
Colorado - Grand Canyon Watershed			
Colorado - Lower Gila Watershed			
Little Colorado River - San Juan Watershed			
Nutrioso Creek headwaters-Picnic Creek	AZ15020001-017	Turbidity	4 A – TMDL approved in 2000.
Nutrioso Creek Picnic Creek-Little Colorado River	AZ15020001-015	Turbidity	4 A – TMDL approved in 2000.
Rainbow Lake	AZL15020005-1170	Excess nutrients/algal blooms and high pH	4 A – TMDL approved in 2000.
Middle Gila Watershed			
Tempe Town Lake	AZL15060106B-1588	High pH related to excess nutrients/algal blooms	4 B – Technology-based management strategy initiated in 2002.
Salt Watershed			
Pinto Creek and Gibson Mine tributary headwaters-Ripper Spring	AZ15060103-018A	Copper	4 A – TMDL approved in 2001.
San Pedro - Willcox Playa - Rio Yaqui Watershed			
Santa Cruz - Rio Magdalena - Rio Sonoyta Watershed			
Arivaca Lake	AZL15050304-0080	Mercury TMDL approved in 2000. (Missing core parameters, pH not meeting standards in 3 of 7 samples, dissolved oxygen not meeting standards in 1 of 7 samples, and fish kill related to algal bloom may indicate narrative standards violation.)	4 A – TMDL approved in 2000.
Pena Blanca Lake	AZL15050301-1070	Mercury TMDL approved in 2000. (Missing core parameters and pH not meeting standards in 2 of 3 samples.)	4 A –TMDL approved in 2000.
Upper Gila Watershed			
Luna Lake	AZL15040004-0840	Excess nutrients/algal blooms, high pH, and low dissolved oxygen causing fish kills. (Missing bacteria samples)	4 A – TMDL approved in 2000.
Verde Watershed			
Oak Creek at Slide Rock State Park	AZ15060202-018A	Bacteria	4 A – TMDL approved in 1999.
Pecks Lake	AZL15060202-1060	Excess nutrients, low dissolved oxygen, and pH	4 A – TMDL approved in 2000.
Stoneman Lake	AZL15060202-1490	Excess nutrients, low dissolved oxygen, and pH	4 A – TMDL approved in 2000.
Verde River 15060202-065 - Railroad Draw	AZ15060202-037	Turbidity	4 A – TMDL approved in 2002
Verde River 15060203 - West Clear Creek	AZ15060203-027	Turbidity (Missing bacteria samples.)	4 A – TMDL approved in 2002

* Including tributaries contributing loadings to the surface water listed, as determined during the TMDL.

4 A = A TMDL has already been completed and approved by EPA but the water quality standards are not yet attained.

4 B = Other pollution control requirements are expected to result in the attainment of water quality standards by the next regularly scheduled listing cycle.

4 C = The impairment is not related to a "pollutant" loading, but is caused by pollution (e.g., hydrologic modification).

ADEQ Hi = 7 M = 17 Low = 12

EPA Hi - M = Low =

PART 5. SURFACE WATERS ASSESSED AS IMPAIRED
The 2002 303(d) List Submission to EPA
(At least one designated use is "impaired")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern Causing Impairment (Other concerns to investigate shown in parenthesis)
Bill Williams Watershed ADEQ priority		
Alamo Lake Hi	AZL15030204-0040	High pH, sulfide, and low dissolved oxygen (Mercury in fish tissue may indicate a narrative toxic standard violation. Note that a fish consumption advisory has not been issued.) add Hg
Boulder Creek headwaters-Wilder Creek M	AZ15030202-006	Fluoride (Missing core parameters.)
Boulder Creek Wilder Creek-Copper Creek M	AZ15030202-005A	Arsenic, copper, and zinc (copper and zinc contaminating only from Wilder to Butte Creek) (Missing core parameters. Beryllium concentrations will meet standards submitted to EPA in 2002 for approval.)
Colorado - Grand Canyon Watershed		
Colorado River Parashant-Diamond Creek L	AZ15010002-003	Turbidity (Missing core parameters.)
Virgin River Beaver Dam Wash-Big Bend Wash L Hi	AZ15010010-003	Turbidity and fecal coliform (E. coli exceeded standards in 1 of 5 samples and missing core parameters.)
Colorado - Lower Gila Watershed		
Painted Rocks Borrow Pit Lake L	AZL15070201-1010	Low dissolved oxygen and high fecal coliform (Fish advisory due to DDT metabolites, toxaphene, dieldrin and chlodane in fish tissue may indicate a narrative toxic standard violation.) add
Little Colorado River - San Juan Watershed		
Little Colorado River Porter Tank-McDonalds Wash Hi	AZ15020008-017	Copper and silver (Need current monitoring data to assess all designed uses.)
Middle Gila Watershed		
French Gulch headwaters-Hassayampa River Hi	AZ15070103-239	Copper manganese and zinc (Missing core parameters. Beryllium concentrations will meet standards submitted to EPA in 2002 for approval.)
Gila River Centennial Wash-Gillespie Dam M	AZ15070101-008	Boron (Fish advisory due to DDT metabolites, toxaphene, dieldrin and chlodane in fish tissue may indicate a narrative toxic standard violation. Beryllium concentrations will meet standards submitted to EPA in 2002 for approval.) add
Hassayampa River headwaters-Copper Creek Hi	AZ15070103-007A	Zinc (Dissolved copper exceeded standards in 1 out of 3 samples.)
Mineral Creek Devils Canyon-Gila River L	AZ15050100-012B	Beryllium, copper, zinc, and low pH (Missing core parameters.)
Queen Creek headwaters-Superior Mine WWTP M	AZ15050100-014A	Copper (Missing core parameters.)
Turkey Creek headwaters-Poland Creek Hi	AZ15070102-036	Cadmium, copper, and zinc (Arsenic exceeded standards in 3 out of 5 samples, lead exceeded standards in 1 out of 5 samples, and missing core parameters.)
Salt Watershed		
Christopher Creek headwaters-Tonto Creek L	AZ15060105-353	Turbidity (E. coli exceeded standards once and missing core parameters.)
Tonto Creek headwaters-Haigler Creek L	AZ15060105-013	Turbidity (Need more samples to determine whether monthly mean standards is being met. Beryllium concentrations will meet standards submitted to EPA in 2002 for approval.)

PART 5. SURFACE WATERS ASSESSED AS IMPAIRED
The 2002 303(d) List Submission to EPA
(At least one designated use is "impaired")

Surface Water Name Segment Description	Waterbody ID	Pollutants of Concern Causing Impairment (Other concerns to investigate shown in parenthesis)
Tonto Creek Rye Creek-Gun Creek	AZ15060101-048	Turbidity
San Pedro - Willcox Playa - Rio Yaqui Watershed		
Mule Gulch headwaters-Bisbee WWTP discharge	AZ15080301-090A	Copper and zinc (pH did not meet standards in 7 out of 15 samples.)
Mule Gulch Bisbee WWTP discharge-Whitewater Draw	AZ15080301-090B	Copper, low pH, and zinc
San Pedro River Dragoon Wash-Tres Alamos Wash	AZ15050202-002	Nitrate (Need current monitoring data will all core parameters. Turbidity and fecal coliform have exceeded standards in older data.)
Santa Cruz - Rio Magdalena - Rio Sonoyta Watershed		
Alum Gulch headwaters-ephemeral reach	AZ15050301-581A	Cadmium, copper, and zinc (pH did not meet standards in 7 out of 7 samples. Missing core parameters.)
Harshaw Creek headwaters-ephemeral reach	AZ15050301-025A	Zinc (Dissolved copper and pH did not meet standards in 1 out of 9 samples, and missing core parameters.)
Nogales and East Nogales Washes Mexico border-Potrero Creek	AZ15050301-011	Chlorine, turbidity, and fecal coliform
Potrero Creek Interstate 19-Santa Cruz River	AZ15050301-500B	Fecal coliform (Missing core parameters.)
Santa Cruz River Mexico border-Nogales International WWTP discharge	AZ15050301-010	Escherichia coli and fecal coliform (Turbidity exceeded standards in 2 out of 9 samples. Beryllium concentrations will meet standards submitted to EPA for approval in 2002.)
Santa Cruz River Nogales International WWTP discharge-Josephine Canyon	AZ15050301-009	Fecal coliform. (Fish abnormalities documented by the US Fish and Wildlife Service may indicate a narrative toxic standard violation. Missing core parameters.)
Santa Cruz River Josephine Canyon-Tubac Bridge	AZ15050301-008A	Fecal coliform and turbidity. (Fish abnormalities documented by the US Fish and Wildlife Service may indicate a narrative toxic standard violation. Missing core parameters.)
Santa Cruz River Tubac Bridge-Sopori Wash	AZ15050301-008B	Fecal coliform (Missing core parameters.)
Three R Canyon headwaters-ephemeral segment	AZ15050301-558A	Cadmium, copper, and zinc (pH did not meet standards in 8 out of 9 samples. Beryllium concentrations will meet standards submitted to EPA for approval in 2002. Missing core parameters.)
Upper Gila Watershed		
Gila River Bonita Creek-Yuma Wash	AZ15040005-022	Turbidity
San Francisco River Limestone Gulch-Gila River	AZ15040004-001	Turbidity
Verde River Watershed		
Beaver Creek Dry Beaver-Verde River	AZ15060202-002	Turbidity (Missing core parameters.)
Oak Creek West Fork Oak Creek-Dry Creek	AZ15060202-018B	Turbidity

* Including any tributary contributing loadings to the surface water listed, as determined during the TMDL.

Appendix E. Arizona's Water Quality Protection Programs

PROGRAM	AGENCY	PROGRAM DESCRIPTION	FURTHER INFORMATION (602) 771-2300 (Toll free instate 1-800-234-5677)
Ambient Monitoring and Assessments	ADEQ, ADWR, USGS, AGFD, and more	ADEQ monitors surface and ground water, sediment, animal tissue, habitat, and biological communities to assess water quality as required under the federal Clean Water Act and state statutes. Surface water quality standards are reviewed and revised in a 3-year cycle.	Ground water monitoring (602) 771-4563 Planning List monitoring (602) 771-4468 Surface water monitoring (602) 771-4219 Surface water standards (602) 771-4219 Assessments (602) 771-4545
Biosolids (Sludge) Management	ADEQ	The use and disposal of sludge from wastewater treatment plants are monitored as established in NPDES permits. Land application of biosolids is regulated under Arizona Administrative Code R18-9-1001 through 1014 (adopted 1996). (See Aquifer Protection Permits)	ADEQ (602) 771-4132
Border Issues (U.S/Mexico Transboundary Water Quality Projects)	ADEQ EPA IBWC	This program conducts water quality studies, follows up transboundary water quality issues, provides hydrological support to the ADEQ border infrastructure projects, and provides general ADEQ Water Border Program coordination in the Arizona-Sonora border area.	ADEQ (602) 771-4409 EPA IBWC
Aquifer Protection Permit (APP)	ADEQ	The APP Program is Arizona's cornerstone program for protecting ground water quality. Any facility that discharges directly into an aquifer or onto the land surface in a manner that could pollute an aquifer must operate in accordance with an Aquifer Protection Permit. General permits cover many categories of less significant and often numerous discharging activities (e.g., most septic tank and leach field systems). However, large discharging facilities, such as mines, industrial facilities, and most wastewater treatment plants require an individual APP.	ADEQ (602) 771-4675
Capacity Development Program	ADEQ	This new program (rules approved in 1999) requires that newly proposed water systems demonstrate their ability to operate in compliance with the Safe Drinking Water Act before receiving approval to commence operation. The purpose of the rules is to help ensure that a viable water system will be formed. (See also Safe Drinking Water)	ADEQ (602) 771-4398
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	EPA, ADEQ, ADWR	CERCLA is commonly referred to as the federal Superfund Program. Administered by ADEQ, it establishes a comprehensive response program for past hazardous waste activities. Funding and enforcement authority provides for long-term remediation of inactive sites. (See also WQARF Program.)	ADEQ(602) 771-4227 EPA (415) 744-2345 ADWR (602) 417-2400
Construction Grant and State Revolving Fund (SRF)	EPA, ADEQ	This program allocates financial assistance to construct publicly owned waste treatment works and nonpoint source prevention facilities. The State Revolving Fund replaced the federal Construction Grants program. Indian Nations are also eligible for funds.	ADEQ (602) 771- 4703
401 Certification and 404 Permits	ADEQ US Army Corps of Engineers	Under the federal Clean Water Act sections 401 and 404, a federal "dredge and fill" permit is required for modification of a stream channel or lake. ADEQ certifies that the modification activities will maintain surface water quality standards.	ADEQ (602) 771-4502 US Arrny Corps of Engineers (602) 640-5385
Hazardous Waste Management Program	ADEQ	Under Arizona's Hazardous Waste Management Act and the Federal Resource Conservation and Recovery Act (RCRA) permits are issued for treatment, storage, and disposal of hazardous wastes. Each facility must meet standards set to prevent releases to the environment and minimize health risks. ADEQ is working with industry and government to find new ways of reducing waste streams and minimizing the volume and toxicity of hazardous waste.	ADEQ (602) 771-4103

PROGRAM	AGENCY	PROGRAM DESCRIPTION	FURTHER INFORMATION (602) 771-2300 (Toll free instate 1-800-234-5677)
National Pollutant Discharge Elimination System (NPDES)	EPA, ADEQ	This programs goal is to ensure Arizona's surface water quality is not compromised by discharges from various sources, especially industrial and municipal wastewater treatment discharges and stormwater runoff. Permits control the amounts of pollutants entering surface waters. The program is coordinated with EPA, which issues all permits. Typically, ADEQ drafts the permit and certifies that the permit meets all state environmental requirements prior to sending it to EPA for issuance.	EPA ADEQ wastewater (602) 771-4665 ADEQ stormwater (602) 771-4574
Nonpoint Source Program	ADEQ	Nonpoint source activities are guided by the state's nonpoint source management plan. Best Management Practices have been adopted by rule for irrigated agriculture and concentrated animal feeding operations, and Best Management Practices guidance has been developed for many other activities. Aquifer Protection Permits are required for many nonpoint source activities.	ADEQ (602) 771-4509
Pesticide Prevention Program	ADEQ, AZ Dept. of Agriculture	Arizona's Pesticide Contamination Prevention Program works to prevent or eliminate water contamination from routine agricultural pesticide use. All agricultural pesticides must be registered and approved for use in Arizona. Information from the registration process is used to generate the Ground Water Protection List.. This list has been used to direct soil, surface and ground water monitoring.	ADEQ (602) 771-4419 Dept. Of Ag. (602) 542-0993
Pollution Prevention Program (Pretreatment)	ADEQ	The program helps Arizona's large hazardous waste generators and toxic substance users reduce waste production, toxic substance use, and environmental releases.	ADEQ (602) 771-4235
Poor Quality Groundwater Withdrawal Permit	ADWR	Permits may be issued for non-irrigation use if the ground water has no other beneficial use and withdrawal is consistent with the Active Management Area's management plan. Permits are issued in conjunction with CERCLA, WQARF, or Underground Storage Tank programs for water treatment.	ADWR 417-2400
Reuse Permits	ADEQ	This program regulates facilities which provide wastewater for reuse. The permits specify the amounts of effluent to be reused and its chemical quality.	ADEQ (602) 771-4687
Safe Drinking Water	ADEQ	Public water supplies are required to monitor the quality of their water and to provide drinking water that meets state and federal drinking water standards. (See Source Water Assessment and Capacity Development Program)	ADEQ (602) 771-4425
Septic System Permits	County Health Depart., ADEQ	Under state statutes and county regulation, the construction and repair of all septic tanks and leaching systems must be approved.	ADEQ (602) 771-4697 Appropriate County Health Department
Solid Waste Management	ADEQ	Under the State's Solid Waste Management Act and federal RCRA, ADEQ reviews and approves: construction of solid waste management facilities, agricultural application of sewage sludge, and temporary facilities for the treatment of petroleum contaminated soils. (See Aquifer Protection Permits)	ADEQ (602) 771-4132
Source Water Assessment	ADEQ	The Source Water Assessment Program, established under the federal Safe Drinking Water Act, provides an inventory of major land use activities adjacent to Public Water Systems. This information will be useful at the local level for making planning and zoning policy decisions to protect water quality for these water supplies. (See Safe Drinking Water)	ADEQ (602) 771- 4425
Total Maximum Daily Loads (TMDLs)	ADEQ	This program address polluted waterbodies through the identification and listing of all impaired waters, the identification source contributions, the establishment of a total maximum daily load for each stressor so that standards are met, and the implementation of a TMDL reduction program.	ADEQ (602) 771-4468
Underground Injection Control and Stormwater Drywell Registration	ADEQ EPA	A permit is required for any "well" which would inject wastewater or stormwater into the ground, including drywells and septic tanks. (See Aquifer Protection Permits)	ADEQ (602) 771-4686

PROGRAM	AGENCY	PROGRAM DESCRIPTION	FURTHER INFORMATION (602) 771-2300 (Toll free instate 1-800-234-5677)
Underground Storage and Recovery Projects	ADWR ADEQ	ADWR issues permits for underground storage and recovery projects. ADWR coordinates with ADEQ to ensure that the project is consistent with water quality requirements as assessed under the Aquifer Protection Permit Program.	ADEQ (602) 771-4686
Underground Storage Tanks (UST)	ADEQ	The UST Program is to ensure the proper operation of underground storage tanks and prevent releases, locate and remediate leaking underground storage tanks, and ensure that tank owners and operators are financially capable of cleanup.	ADEQ (602) 771-4268
Water Quality Assurance Revolving Fund (WQARF)	ADEQ	The state WQARF program parallels the federal Superfund Program, providing funds for monitoring, risk assessment, matching funds, and remediating hazardous substances which may pose a hazard to "waters of the State." Mitigation of nonhazardous substances is also allowed under state statutes.	ADEQ (602) 771-4194
Water Quality Management Planning/Watersheds	ADEQ, local agencies	ADEQ coordinates water quality management planning in Arizona. Planning provides a mechanism to identify broader goals and strategies to solve water quality problems. ADEQ delegates authority and responsibilities to local agencies.	ADEQ (602) 771-4509
Wellhead Protection	ADEQ	A voluntary program to promote and support groundwater protection efforts by delineating and managing wellhead protection areas around public drinking water supply wells.	ADEQ (602) 771-4425
Well Permits	ADWR	Under state statutes, all wells must be registered, new wells must be approved prior to construction, well drillers must be licensed, a well drilling log must be submitted, and wells must be properly constructed, abandoned or capped.	ADEQ (602) 542-1581

The Status of Water Quality in Arizona – 2002

Volume II. Studies and Analyses of Watersheds Related to the 2002 305(b) Report and the 303(d) List

EQR02-004

The Status of Water Quality in Arizona – 2002
Volume II. Studies and Analyses of Watersheds
Related to the 2002 305(b) Report and the 303(d) List

Prepared by:
Diana Marsh

Editing and assistance: Nancy LaMascus, Steve Pawlowski, Kris Randall, and Linda Taunt
Graphic assistance: Lisa Rowe and Danese Cameron
Database assistance: Chris Conneran, and Eileen McMullen
Groundwater analysis: Doug Towne
Surface water assessments: Mathew Barry, Julie Collins, Max Enterline, Cheri Horsley, Robert Mills, and Jeffrey Servoss

Attaining Uses

Streams (miles)	50%	1255/2530
Lakes (acres)	28%	20,273/72,396

TMDLs approved

31/120 = 25%

Elizab tate collecting the data used in this report:
id, Lin Lawson, Angela Lucci, Doug McCarty, Chris Notgrass, Kyle
, Patti Spindler, Doug Towne, and R. Scott Williams

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77

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A special thanks to the ambient monitoring staff who travel across the state collecting the data used in this report:
Elizabeth Boettcher, Susan Fitch, Rebecca Followill, Jennifer Hickman, Lee Johnson, Sara Konrad, Lin Lawson, Angela Lucci, Doug McCarty, Chris Notgrass, Kyle Palmer, Matt Oller, Greg Olsen, Samuel Rector, Amanda Ryan, Robert Scalamera, Patti Spindler, Doug Towne, and R. Scott Williams

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Table of Contents

TABLES Page

FIGURES Page

Scope and Purpose of Volume II

Volume I provides what is essentially required to fulfill mandates in the Clean Water Act section 305(b) and 303(d). It included the following information:

- General background information;
- Terms and abbreviations used in this report;
- A description of the assessment and listing process, including statutes, rules, and standards governing this process;
- A summary and interpretation of assessments, including the five-part assessment list;
- The status and recommendation of waters on the 1998 303(d) List;
- The proposed 2002 303(d) List of impaired waters, including priority and scheduling of the TMDL;
- An overview of ground water quality in Arizona; and
- A description of key programs involved in assessment and remediation of water quality problems, including the monitoring program.

Volume II documents the data analyses for the assessments and listing actions in Volume I. It also provides the watershed context for these assessments, including descriptions of research being conducted that may influence these and future assessments. Volume II provides the following information:

- The watershed approach to water quality management;
- Watershed improvement funds available;
- Water quality research occurring in Arizona;
- Watershed discussions of water quality, including:
  - General watershed information,
  - Monitoring data available for each surface water,
  - Surface water assessments, and impaired waters identification.
  - Ground water quality information, maps, and tables
  - Studies and water quality improvement activities.

Volume I and Volume II are intended to be used together and not as separate reports; therefore, information is not repeated in these volumes. To understand information in Volume II, the reader will need to refer to the assessment and listing process, rules, abbreviations, and standards provided in Volume I. References for both volumes are provided in Volume II, where the bulk of the citations are made. This report has been split into these two volumes primarily because of the size of the report.

What is Arizona's Watershed Approach?

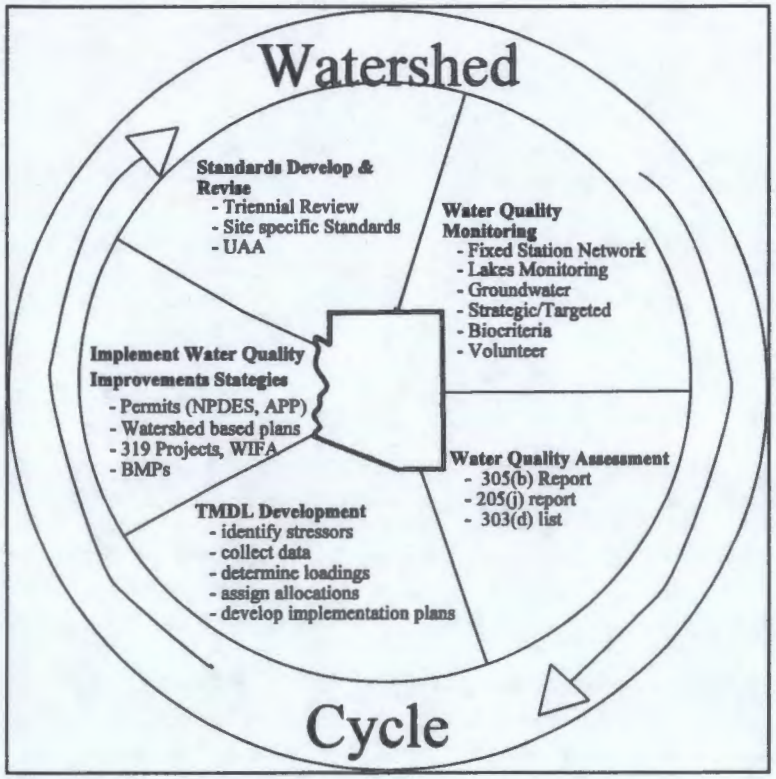


Figure 1. Watershed Cycle

The1997, ADEQ drafted *The Arizona Statewide Watershed Framework* that described planning and management activities that could be integrated to address water quality issues on a watershed basis using a watershed management cycle **(Figure 1)**. Each of the ten watersheds identified in Arizona **(Figure 2)** would have a sequence of programs and activities occurring in an iterative manner.

Some of ADEQ's water quality programs readily fit this watershed focused approach, while others do not. For example, ambient water quality monitoring becomes more efficient by focusing resources on one watershed at a time; however, initial permits must be issued as needed and cannot be delayed until the focus watershed is active. Once issued, permits can be scheduled for renewal based on a watershed rotation. ADEQ believes the watershed approach is improving efficiency, increasing inter-agency and intra-agency communication, and maximizing resources. Activities where the watershed approach is actively being used by ADEQ include:

- Ambient surface water quality monitoring (see Chapter VII in Vol. 1);
- Assessment of water quality conditions;
- Participation in locally-led watershed groups to identify and address water quality and quantity issues;
- Implementation of Water Quality Improvement Grants;
- Collaboration with local watershed groups to develop watershed-based plans; and
- Renewal of surface water discharge permits (NPDES/AZPDES).

The schedule for watershed activities is shown in **Table 1**.

Table 1. Watershed Focus Activities

Watershed	Monitoring	NPDES/AZPDES Permit
Bill Williams	2003, 2008, 2013	1996, 2001, 2006
Colorado-Grand Canyon	2004, 2009, 2014	2000, 2005, 2010
Colorado-Lower Gila	2003, 2009, 2013	1996, 2001, 2006
Little Colorado-San Juan	2001, 2006, 2011	1999, 2004, 2009
Middle Gila	2002, 2007, 2012	1996, 2001, 2006 Agua Fria, Hassayampa 1997, 2002, 2007 Granite Reef to Painted Rock 1998, 2003, 2008 Coolidge Dam to Salt River
Salt	2002, 2007, 2012	1998, 2003, 2008
San Pedro - Willcox Playa-Rio Yaqui	2000, 2005, 2010	1999, 2004, 2009
Santa Cruz-Rio Magdalena-Rio Sonoyta	2001, 2006, 2011	2000, 2005, 2010
Upper Gila	2000, 2005, 2010	2000, 2005, 2010
Verde	1999, 2004, 2008	1999, 2004, 2009

Figure 2. Arizona's Watersheds

What is a Watershed-based Plan and why develop one?

States, territories, and tribes were directed by EPA's Clean Water Action Plan of 1998 to develop and implement action strategies for watersheds not meeting clean water and other natural resource goals. The plans to restore surface waters within a given watershed were known as Watershed Restoration Action Strategies (WRAS). The focus of these plans have been expanded to include preventative measures to minimize discharges of nonpoint source pollution, and have been renamed as Watershed-based Plans.

EPA envisioned that the state, territory and tribal agencies would work collaboratively with private-sector organizations and concerned citizens to develop effective and cost efficient ways to implement strategies, and thereby restore the health of watersheds.

As directed by the Clean Water Action Plan, Arizona developed a Unified Watershed Assessment in 1998, and prioritized Arizona's 84 eight-digit Hydrologic Unit Code (HUC) "watersheds" from greatest environmental resource concern to the least. Four assessment categories were used to classify Arizona watersheds, including:

- Category I In need of restoration,
- Category II In need of preventive action,
- Category III Pristine or sensitive aquatic systems, or
- Category IV Insufficient data to assess.

Since 1998, several Watershed-based Plans have been completed **(Table 2)**. ADEQ uses this planning process to identify areas for watershed improvement projects and to build more effective watershed partnerships. Proposed water quality improvement projects with a detailed watershed-based assessment and plan can more efficiently identify the scope and details of watershed improvement needs to facilitate obtaining funds for watershed improvements (see the following Water Quality Improvement Grants discussion).

ADEQ has identified six critical elements for an acceptable Watershed-based Plan or a similar planning document. Equivalent plans could include a TMDL report, Forest Management Plans and other planning documents, as long as the document successfully addresses the six critical elements identified below:

- Identification of specific water quality and natural resource problems that need to be addressed, including the sources of pollution and the relative contribution of nonpoint source pollution for TMDL studies.
- A detailed description of the restoration actions that should be taken to achieve desired water quality and natural resource goals and outcomes. These include implementation strategies identified for TMDL studies.
- Monitoring and evaluation activities that define water quality problems or assess progress toward achieving water quality and natural resource goals.
- Funding needs and sources to support the implementation and maintenance of restoration measures.
- A schedule for implementation of needed restoration measures and identification of appropriate lead agencies and community oversight for implementation, maintenance, monitoring and evaluation of improvement projects.
- Public outreach methods that will be used to engage and maintain local community and government involvement.

Table 2. Status of Watershed-based Plan Development

WATERSHED	WATERSHED-BASED PLAN DEVELOPMENT
Bill Williams	
Colorado-Grand Canyon	Northwest Arizona Watershed Council -- under development
Colorado-Lower Gila	
Little Colorado-San Juan	Upper Little Colorado River (LCR) Watershed Partnership – drafted LCR Multi-Objective Management Group (MOM) – adopted
Middle Gila	Tres Rios River Management Group – adopted Upper Agua Fria Watershed Partnership – adopted
Salt	Lower Verde-Lower Salt Watershed Advisory Group – adopted
San Pedro-Willcox Playa-Rio Yaqui	Middle San Pedro Partnership – under development Upper San Pedro Partnership – draft
Santa Cruz-Rio Magdalena-Rio Sonoyta	
Upper Gila	Upper Gila Partnership – adopted
Verde	Oak Creek Canyon Task Force – draft Verde Watershed Association – adopted

By involving local communities, tribes, and private-sector organizations, Arizona is focusing and prioritizing restoration activities to achieve

demonstrable improvements in water resources, aquatic ecosystems and watershed health. More information is at: http://www.adeq.state.az.us/comm/download/watcr.

What funds are available to implement strategies?

Numerous funding sources can be used for projects that improve water quality in Arizona. Three of those funds include:

- Water Quality Improvement Grants, administered by ADEQ;
- Water Protection Funds administrated by an ADWR commission; and
- Water Infrastructure Financing Authority.

Water Quality Improvement Grants –The Water Quality Improvement Grant Program distributes grant funds under Section 319(h) of the federal Clean Water Act to both public and private entities within Arizona. These grants are to implement on-the-ground water quality improvement projects that address nonpoint sources of pollution. Project summaries of Water Quality Improvement Grant projects are included in the watershed discussions in this volume of the report.

Grant applications that contain activities identified in a Watershed-based Plan (or equivalent plan) are given priority over other projects.

For a grant application to be considered eligible for evaluation, the application must comply with the process described in the current *Water Quality Improvement Grant Program Manual*, and the project description must indicate how all of the following will be accomplished:

- Improve, protect or maintain a surface water in Arizona by addressing a nonpoint source of pollution;
- Demonstrate acceptable water quality management principles, sound design, and appropriate procedures;
- Yield benefits to the state at a level commensurate with project costs;
- Have an on-the-ground implementation component within Arizona;
- Provide for at least 40% of the project costs as non-federal match;
- Support the ADEQ, Water Quality Division Mission; and
- Be eligible under applicable state and federal regulations.

The Water Quality Improvement Grant Manual provides details about the grant program and includes the application forms. For more information about the Water Quality Improvement Grant Program or to be added to the program's mailing list, please contact the program at (602) 771-4635 or toll free in Arizona, (800) 234-5677, Ext. 4635, or email at: ward.susan@ev.statc.az.us or on the web site at: http:\\www.adeq.statc.az.us/environ/water/mgmt/planning.

Watershed Protection Funds – In 1994, the Arizona Water Protection Fund was established to implement projects that would maintain, enhance, and restore rivers, streams, and associated riparian resources, including fish and wildlife that are dependent on these habitats. In previous years, the legislature has provided $5,000,000 annually in grants to fund proactive incentives to implement water quality and water quantity restoration actions. However, in 2002, funding was limited to $500,000 due to deficits in the state budget.

Any individual, entity, state or federal agency, or political subdivision of Arizona may submit an application to the Arizona Water Protection Fund Commission. Project summaries of Water Protection Fund projects are included in the watershed discussions in this volume of the report. A list of projects currently funded is published annually (ADWR, 2000). For further information, please contact the commission at (602) 417-2400 extension 7016.

Water Infrastructure Financing Authority – Political subdivisions may obtain these funds to finance the following types of water quality improvement projects:

- The design, construction, improvement. or refinancing of publicly owned treatment facilities that are consistent with the areas water quality management plans (208 plans); or
- A nonpoint source implementation project. Projects can include training and public education, development of pollution source reduction management practices (Best Management Practices), demonstration projects, or other activities associated with the control of nonpoint sources of pollution.

What Water Quality Research is Occurring In Arizona

A number of research efforts have looked or are looking at regional water quality concerns. Other significant national studies and guidance documents of regional importance are also cited in this section. These studies discussed here are not limited to a single watershed or ground water basin. Studies conducted within a specific watershed are summarized in the watershed discussions that follow.

Biocriteria Development for Arizona – ADEQ has been developing methods for assessing the biological integrity of perennial, wadeable streams in Arizona since 1992. According to recently updated EPA Rapid Bioassessment Protocols (USEPA, 1999c), regional reference conditions should be developed first to establish one or more index of biological integrity.

An Index of Biological Integrity

Biological integrity is the capability of supporting and maintaining a balanced, integrated, adaptive community of organisms, having a species composition, diversity, and functional organization comparable to that of the natural or least impacted habitat of the region. This least impacted diversity becomes the primary reference condition used to measure and assess water quality. "Reference conditions" are then a composite of community characteristics for least impacted (reference) sites within a region.

A macroinvertebrate index of biological integrity is calculated based on a variety of quantified biological attributes that measure community structure, function and tolerance (e.g., total taxa richness, percent composition by individuals in the scraper feeding group, or overall community tolerance). Using the appropriate index of biological integrity, the biological integrity of a site can be determined by comparing its community characteristics to those of the reference community.

Currently a warm water and a cold water community index have been established for perennial, wadeable streams. Indexes for other surface water types may eventually be developed.

The following reports have been produced by this program and can be obtained by contacting ADEQ at (602) 771-4543 or -4219:

- *Using Ecoregions for Explaining Macroinvertebrate Community Distribution Among Reference Stream Sites in Arizona* (ADEQ, 1996b) critiques the use of ecoregions and indicates alternative classification systems based on elevation may provide better differentiation among reference communities in Arizona.
- *Macroinvertebrate Community Distribution Among Reference Sites in Arizona* (ADEQ, 2001a) describes a regional reference site approach based on a warm water community (below 5000 feet elevation) and a cold water community (above 5000 feet elevation).
- *Biocriteria Program Quality Assurance Program Plan (QAPrP)* (ADEQ, 2001b). This document establishes the bioassessment methods and protocols ADEQ is following and one that would meet credible data requirements established in the new Impaired Waters Identification rules. Methods for measuring physical-habitat to support bioassessment are also included in this document.
- *Development and Testing of a Biological Index for Warmwater Streams in Arizona* (Gerritsen and Leppo, 1998). A warm water macroinvertebrate community biological index is established for perennial, wadeable streams below 5000 feet elevation.
- *Development and Testing of a Biological Index for Coldwater Streams in Arizona* (Leppo and Gerritsen, 2000). A cold water macroinvertebrate community biological index is established for perennial, wadeable streams above 5000 feet elevation.

Physical Integrity Assessment Methods Development – The objective of the federal Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

Physical Integrity

Physical integrity in streams can be defined as the dynamic stability of a stream channel. Stream stability is defined as the ability of a channel to carry the water and sediment of its watershed while maintaining it's dimension, pattern, and profile without aggrading or degrading over time (Leopold, 1994). As streams go through a natural cycle of aggradation (accumulation) and degradation (erosion) and lakes naturally accumulate sediment, acceptable physical integrity will probably eventually be defined by the speed of the process and resource management goals for that surface water. Currently, ADEQ is developing methods to accurately measure characteristics of physical integrity.

Arizona's current standards are primarily based on measurement of chemical conditions. To initiate development of meaningful physical integrity criteria ADEQ is performing geomorphic surveys on streams. This research has focused on:

- Developing regional curves to estimate bankfull stage by correlating watershed size with stream hydraulic measurements such as cross sectional area, average depth, width and discharge at bankfull stage;
- Testing Rosgen's (1996) Bank Erodibility Hazard Index (BEHI) (the potential for a stream bank to erode) for application in Arizona;
- Creating sediment rating curves to evaluate excess sediment loads in reference versus impacted streams.

Over the past decade, a system for classifying and assessing rivers has been developed by Rosgen (1996). By identifying bankfull stage, waters can be classified into one of seven stream types using Rosgen's methods. These classification and assessment methods are being applied to Arizona's streams by ADEQ, the U.S. Forest Service, the U.S. Bureau of Land Management, and others.

This research has led to the publication of the following reports:

- *Analysis of Water Quality Functions of Riparian Vegetation* (Engineering Science, 1994). This is a technical review of existing scientific knowledge on the functional roles of riparian vegetation in controlling surface water quality. The report provided information about the types of water quality functions that a riparian area or wetland can provide and the characteristics of the riparian or wetland type that enables it to perform each function.
- *A Guidance Document for Monitoring and Assessing the Physical Integrity of Arizona's Streams* (Graf and Randall, 1998). This document outlines a set of basic scientific principles for understanding and describing physical integrity in terms of indicator measurements such as: channel width, channel depth, channel gradient, hydraulic roughness, flow velocity, water discharge, sediment discharge, sediment particle size, channel sinuosity, channel pattern, shear stress, stream power, and bankfull condition.
- *Regional Relationships for Bankfull Stage in Natural Channels for Central and Southern Arizona* (Moody and Odem, 1999). Sites on perennial, intermittent, and ephemeral streams in central and southern Arizona were chosen to determine the regional relationships of bankfull stage in natural channels. Bankfull discharge and channel characteristics of width, mean depth, and cross-sectional area were plotted as a function of drainage area to create "regional curves." These regional curves can then be used to identify bankfull in any other natural channel. Bankfull determinations are necessary for surveying and classifying streams according to Rosgen (1996).
- Draft *Regional Relationships Between Hydrologic and Hydraulic Parameters in the State of Arizona* (Odem et al., draft 2001). This report integrates data collected at ADEQ's Biocriteria Program reference sites with data collected at sites in Moody and Odem's study (1999) to update Arizona's regional curves with additional data and then statistically evaluates several regional relationships.
- Draft *Bank Erosion at ADEQ Biocriteria Reference Sites in the Verde River and San Pedro River Surface Water Basins* (Odem et al., draft 2001). Bank stability and overall stream stability were evaluated for 20 biocriteria reference sites in the Verde and San Pedro surface water basins. This project was an initial test and evaluation of Rosgen's BEHI model for use in Arizona.
- Draft *Evaluation of the BEHI Bank Erosion Prediction Model in the Verde River and San Pedro River Surface Water Basins* (Odem et al., draft 2001). Bank Erosion Hazard Index data from 49 additional sites in the Verde and San Pedro surface water basins collected in 1999-2001were added to the first 20 sites (see report above). Results indicated that Rosgen's BEHI is <u>not</u> an accurate predictor of short term erosion rates for these watersheds. Better results might be found over a longer time period and with more accurate near bank stress values which incorporate stream gradient.

ADEQ recently received an Arizona Watershed Protection Fund grant to determine the feasibility of developing physical integrity criteria and which indicators best describe physical conditions. The best physical integrity indicators will be later tested around the state in different ecosystems to develop universal application. Measurements to support a Bank Erosion Hazard Index, rating curves, pebble counts, bioassessments, and water quality based assessment will be collected at perennial, intermittent, and perennial sites. This work is to be completed in Cienega Creek in the Santa Cruz surface water basin. ADEQ wants to determine if regional curves hold true for non-perennial streams.

The Urban Lakes Study – The "Arizona Urban Fishing Lake Limnological Characterization Program" was initiated by the Arizona Game and Fish Department, in cooperation with ADEQ, in December 1997. This study was prompted by the need for reliable water quality and limnological data on artificial, municipal lakes in the arid southwest. These "urban" waters receive unparalleled recreational angling use in this state.

This was a reconnaissance level survey representing limnological and water quality conditions in Arizona's urban lakes. These baseline data are useful as baseline for future evaluation of lakes or comparison with other urban waters. Some broad management recommendations are offered based on this study, but no specific management prescriptions are provided for each lake.

To determine water quality conditions in urban lakes, target analytical groups were monitored once a quarter for one year in seven lakes: Alvord, Cortez, and Papago #3 in Phoenix, Chaparral in Scottsdale, and Kennedy, Lakeside, and Silverbell in Tucson. These lakes were chosen because they had either a history of water quality concerns or because they were representative of other shallow urban lakes.

Findings are to be published by AGFD soon. Preliminary findings include:

- These urban lakes were much higher in pH, nutrients, and chlorophyll *a* than other waters in their watersheds.
- These lakes experience seasonal extremes with respect to temperature, pH, and low dissolved oxygen that exceed the ranges for fish health and growth, and they exceed state surface water quality standards for their designated uses.
- As expected in a closed system with high evaporation and urban runoff in an arid region, these urban lakes are more saline and are moving towards a sulfa-chloride or chloride dominant water as opposed to the worldwide carbonate dominant waters.
- Based on chlorophyll *a* and algae density, these lakes are highly productive. The algal species are dynamic and opportunistic.
- Seasonal ecosystem responses to high primary production include: decreased carbonate and calcium ion levels, increased pH, erratic or depressed dissolved oxygen concentrations, and lowered levels of phosphorus in sediment and waters.
- Nuisance blooms and species of algae at several lakes are indicative of pollution and advanced eutrophication. Algae may cause odor problems, release toxins into the lakes affecting fish health, contribute directly to fish kills due to oxygen crashes and interfere with fishing and overall aesthetics.
- Annual trends in nutrient concentrations indicate temporary summer stratification caused anoxic hypolimnetic conditions, mobilizing phosphorous concentrations from sediment to the water column. There were no seasonal trends in total nitrogen concentrations. Unionized ammonia levels approached recommended thresholds above which trout and catfish health and growth may be negatively affected.
- Urban lakes are impacted by urban runoff as evident by the concentrations of Total Petroleum Hydrocarbon in the sediment; however, bioaccumulation of this contaminant does not seem to be a concern as fish tissue lacked detectable concentrations.
- Analysis of metals in water, soil and fish tissue indicated that only beryllium exceeded a water quality standard in only one sample, while copper and cadmium concentrations in sediment were at levels EPA's National Sediment Quality Survey for surface Waters (year) has found to have "effects that occasionally occur" and could pose a threat to aquatic wildlife. Copper sulfate is a widely used algaecide and herbicide used to control algae. Cadmium may be introduced through air deposition and effluents from manufacturing operations and municipal effluents. All metal concentrations in fish tissue were below detectable levels and pose no health threats due to fish consumption.

For further info, contact Arizona Game and Fish Department's Urban Fishery Program at (602) 789-3257 or ADEQ's Lakes Program at (602) 771-4541.

Arid West Water Quality Research Project – Pima County is administrating a major grant from EPA to develop appropriate water quality criteria for the arid and semi-arid West, and to improve the scientific basis for regulating water quality from effluent and storm water discharges for the arid and semi-arid West. The research is designed to produce results that will protect the species and habitats characteristic of ephemeral and effluent dependent stream ecosystems.

The arid and semi-arid portion of the western United States is characterized by annual precipitation totals of less than 15 inches or less. The majority of waterways south of 40°latitude are ephemeral, carrying water only in response to rainfall events. The only water present in a stream may be treated wastewater

effluent. This are is delineated geographically as:

East to south-central Texas, western Montana, and Nebraska;
West to the eastern slopes of the Sierra Nevada and Cascade Ranges along the Pacific coast;
North to the Canadian border; and
South to the Mexican border.

Flora and fauna assemblages also differ significantly from more humid regions of the United States. National water quality criteria have been developed to protect aquatic species that are not representative of species important to ephemeral and effluent-dependent streams. There is a need to develop techniques to evaluate the effects of storm water flows on the biota, and to measure the enhancement or degradation of ephemeral stream resources associated with storm water flows.

A number of research topics have been identified, and the Arid West Project has entered the research phase. Information about research topics can be obtained at the project's web site: http://www.co.pima.az.us/wwm/wqrp/indcx.html. Examples of this research include:

- **Extant criteria evaluation** – This project is to examine the appropriateness and potential weaknesses of applying national ambient water quality criteria, which were used to set Arizona's surface water quality standards, for arid western ecosystems. This project is to recommend future research to address these potential weaknesses.

  To analyze the appropriateness of ambient water quality criteria for arid western ecosystems, three basic issues must be addressed.
  1) What should the pollutant concentration averaging periods be for effluent dependent or ephemeral streams?
  2) How often can a standard be exceeded and still protect the biota in these systems?
  3. To what extent do water quality characteristics (e.g., pH, dissolved organic carbon, and hardness), and their variability, influence chemical bioavailability.

  The criteria for the following constituents will be used as models, as they are of concern to dischargers in the arid West: copper or silver, selenium or mercury, diazinon or nonylphenol, and ammonia. Each will be reviewed with regards to the biological, physical, and chemical characteristics of arid West surface waters.

- **Habitat characterization study** – Ten sites, where treated effluents are being discharged into normally dry surface waters, have been selected to characterize aquatic and riparian habitats. Three of these sites are in Arizona. Habitats will be characterized relative to the physical, chemical, and biological constituents present upstream and downstream of the discharge points.

  A report of the historic data collected at these sites has been completed. This report includes an analysis of the water quality regulatory framework affecting arid West states.

  The next phase of this project will identify the following: similarities and differences among sites, a habitat classification method, and recommendations for further study.

- **Survey of municipal NPDES dischargers** – A survey of dischargers in the arid West was conducted to obtain information on the following:

  a. Issues and problems,
  b. discharge rates,
  c. designated uses of receiving waters as defined in state standards, and
  d. physical, chemical, and biological characteristics of receiving waters.

  The following 17 states were surveyed through a written questionnaire and telephone conversations an: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming.

NAWQA - Central Arizona Basins Study Unit – The U.S. Geological Survey included the Central Arizona Basins Study Unit as one of 51 water quality study units in the National Water Quality Assessment (NAWQA) Program. The NAWQA Program seeks to improve the scientific and public understanding of surface and ground water quality (Gilliom et al., 1995).

The Central Arizona Basins Study Unit covers 34,700 square miles in Arizona. Water, sediment, and biological samples (e.g., animal tissue, macroinvertebrate

samples) were collected in streams in urban, agricultural, forest, and rangeland areas to determine the effects of land use on water quality. At most sites, water samples were collected monthly from late 1995 through early 1998, and at some stream sites additional samples were collected during storms to assess the effects of storm water runoff on water quality. Two sites were sampled twice monthly for 1 year to determine the occurrence and distribution of pesticides. A single round of sampling for contaminants in streambed sediment and fish tissue was completed in 1995-1996.

Ground water was also sampled to determine the effects of human activities on water quality. Three alluvial basins were monitored:

a. West Salt River Valley,
b. Upper Santa Cruz Basins,
c. Sierra Vista subbasin (of the upper San Pedro).

Existing wells were monitored, except in the West Salt River Valley, where shallow monitoring wells were installed and sampled to determine the effects of irrigated agriculture on shallow ground water quality.

The analysis of this data has resulted in the publication of a series of reports that are available through the U.S. Geological Survey. To obtain copies, contact USGS in Tucson at (520) 670-6135.

- *Water Quality in the Central Arizona Basins 1995-1998* (Cordy et al., 2000) summarizes the major findings about water quality.
- *Water Quality Assessment of the Central Arizona Basins, Arizona and Northern Mexico – Environmental Setting and Overview of Water Quality* (Cordy et al., 1998). This report provides a description of the physical, chemical, and environmental characteristics that may affect water quality in the Central Arizona Basins study area and it presents an overview of surface and ground water quality.
- *Organochlorine Compounds in Streambed Sediment and biological Tissue from Streams and Their Relations to Land Use, Central Arizona* (Gebler, 2000) discusses the occurrence and distribution of organochlorine compounds (pesticides) and their relation to land use.
- *Ground Water Quality in the Upper Santa Cruz Basin, Arizona, 1998* (Coes, et al, 2000) assesses ground water quality and identifies factors affecting ground water quality in this basin. In addition, pre-existing data for six wells were analyzed to determine changes in water quality within the basin over time.
- *Ground Water Quality in the Sierra Vista Subbasin, Arizona, 1996-1997* (Coes, et al, 1999) assesses ground water quality in this basin, looking for statistically significant relationships between water quality and well location, well depth, aquifer type, geology, land use, and changes in water quality based on samples collected in 1950-1965.
- *Water Quality of Selected Effluent Dependent Stream Reaches in Southern Arizona as indicated by Concentrations of Periphytic Chlorophylla a and Aquatic Invertebrate Communities* (Gebler, 1998) is a short report comparing water quality in two effluent dependent waters with sites in noneffluent dependent surface waters based on levels of Chlorophyll *a* and the taxonomic composition and abundance of aquatic invertebrates.
- *Physical Habitat and Geomorphic Data for Selected River Reaches in Central Arizona Basins, 1995-98* (Beaulieu et al., 2000). This report presents data from physical habitat and geomorphic measurements taken at 11 stream reaches from 1995-1998. In addition, the extent and type of dominant riparian vegetation along each reach were characterized.

EMAP Western Pilot Study – EPA created the Environmental Monitoring and Assessment Program (EMAP) Program to develop tools to monitor and assess the status and trends of national ecological resources. The primary goal of the EMAP Western Pilot Study is to generate state and regional scale assessments of ecological resources in 13 western states (including Arizona) and to identify stressors associated with the degradation of these resources. Beginning in 1999, this 5-year effort is to demonstrate the application of these monitoring and assessment tools across a large geographical area in western United States.

In Arizona, 50 sites will be sampled once during a four year period. A probability-based sampling approach is used to monitor the ecological condition of surface waters. Perennial, wadeable streams will be monitored for environmental indicators of pollutant exposure and habitat condition, including:

- aquatic macroinvertebrate, fish, and periphyton assemblages
- water quality
- physical habitat structure and riparian condition

In addition, the following indicators may be added depending on local importance and resource availability: fish tissue, priority pollutant toxic

chemicals, water chemistry toxicity, sediment metabolism, sediment chemistry, sediment toxicity, amphibians or bird tissue, bacteria, biomarkers (e.g. caffeine), and riparian conditions.

Because random selection of sites support statistical analysis and inferences, EMAP is designed to:

- Identify broad scale associations;
- Estimate the condition of wadeable perennial streams;
- Estimate the percent of stream miles having desirable and good condition;
- Strengthen statewide water quality and biological assessments; and
- Identify potential reference conditions.

It will not demonstrate localized cause and effect relationships or show trends in water quality. Further information about this project is available on EPA's website at: http://www.epa.gov/emap/.

Perchlorate Study – In 1999, a total of 112 perchlorate samples were collected to determine the occurrence of perchlorate in Arizona. These samples were collected by the Arizona Small Utilities Association and City of Phoenix staff for three site categories:

- Sites where perchlorate had been detected in 1998 by EPA monitoring (in Lake Mead, along the Colorado River to Yuma, at several locations along the Central Arizona Project (CAP) canal),
- Wells and surface water near potential sources of perchlorate (e.g., wells injecting CAP water, the San Pedro River near St David, Camp Navajo well, Luke Air Force Base well, Lake Mary and Woody Mountain Treatment Plant in Flagstaff), and
- Drinking water wells and surface water sources used by the Phoenix municipal system (e.g., Lake Pleasant, Central Arizona Project canal, Salt River, Verde River, and wells).

In an earlier study, perchlorate had been found in Lake Mead and downstream in the Colorado River at Yuma and in the Central Arizona Project canal at Lake Havasu. This perchlorate (ammonium perchlorate) stems from activities including a 1988 explosion at a rocket fuel plant near Henderson, Nevada and subsequent movement of the chemical down the Las Vegas Wash into Lake Mead.

Perchlorate is exceedingly mobile in water and can persist for many decades. Perchlorate is manufactured for use in solid propellants for rockets, missiles and fireworks. Perchlorate salts are used to inflate air bags, in nuclear reactors and electronic tubes, as additives in lubricating oils, in tanning and finishing leather, as a component in fabrics and dyes, in electroplating, in aluminum refining, in rubber manufacture, and in the production of paints.

No drinking water, ground water, or surface water quality standards exist for perchlorate. Arizona's Department of Health Services has calculated a health guidance level for drinking water at 31.5 µg/l (parts per billion) for adults and 14 µg/l for children. Both of these calculations include a safety factor.

Perchlorate values in surface water samples in Arizona ranged from 8.5 µg/l to less than detection limit of 4 µg/l, The highest level was found in Lake Mead near the Kingman Wash Bay. Perchlorate was not detected in any ground water samples (less than 4 µg/l).

ADEQ continues to closely monitor the perchlorate situation in Arizona. Beginning in 2001, all community water systems serving more than 10,000 people will monitor for perchlorate.

MTBE Study -- In 1998, a study of possible ground and surface water contamination by methyl tertiary butyl ether (MTBE) was initiated by ADEQ in cooperation with the USGS. Gasoline blends containing MTBE have been used in Phoenix and Tucson metro areas to help curb air pollution since 1989. Once released to the environment (due to spillage or storage tank leakage), MTBE has physical properties that cause larger areas of soil contamination and more persistent contamination than other gasoline components.

EPA currently concludes that there is a lack of information regarding health effects and occurrence of MTBE; therefore, a drinking water standard has not been established. However in 1997, EPA issued a Drinking Water Advisory that states that concentrations of MTBE in the range of 20 to 40 µg/L or below in water will probably not cause unpleasant taste and odor for most people. The Arizona Department of Health Services (ADHS) has established a health-based guidance level for MTBE in drinking water at 94 µg/L. ADEQ also established a Soil Remediation Level of 320 mg/kg in residential areas and 3,300 mg/kg in non-residential areas.

Samples were collected from 20 public water systems serving over 10,000 people and a number of Salt River Project production wells in Maricopa County. ADEQ also looked at samples collected between 1994-2001 by public water systems serving smaller populations and other wells in Maricopa County. This data indicates only a small number of MTBE detections between 0.5-19 µg/L (under guidance levels established by EPA or ADHS). Public water systems continue to monitor for MTBE and ADEQ plans to sample wells in the Phoenix AMA for a wide range of parameters, including MTBE; however, the sampling dates have not yet been established.

The Lakes Program has also monitored of drinking water reservoirs to determine whether watercraft exhaust and spills associated with refueling has caused water contamination. Samples have been collected at 5 reservoirs from January - August 2001. A preliminary review of this monitoring reveals that MTBE concentrations are all below 20 µg/L.

More information on MTBE is available at ADEQ's Web Site: http://www.adeq.state.az.us/comm/download/waste.html (MTBE Report).

University Research Projects –

- Autecology and Restoration of *Sporobolus wrightii* Riparian Grasslands in Southern Arizona – In 1999, Arizona State University completed a study of the natural processes allowing for regeneration and maintenance of *Sporobolus wrightii* (giant sacaton) riparian grasslands along rivers in southern Arizona. This information will be used to determine the natural recovery and restoration potential of this type of community on abandoned agricultural fields located along these alluvial river systems.
- Quantifying Anti-erosion Traits of Stream Bank Graminoids – In 1997, Arizona State University completed a study of the physical traits of stream side grasses and grass-like plants (graminoids) to determine their potential capacity to stabilize stream banks. The study sites were located on Cienega Creek in Pima County. The study looked at grasses and graminoids in terms of their erosion prevention effectiveness for stream restoration and bank stabilization projects.
- Response of Bebb Willow to Riparian Restoration – In 1999, Northern Arizona University studied what happened when water flow was restored through a decadent Bebb willow ecosystem. The response of the plant community to water flow was quantified and compared. The project was intended to improve understanding of the structure, function and dynamics of a watershed and its associated terrestrial and riparian ecosystems.
- Evaluation of Carex Species for Use in Riparian Restoration – Northern Arizona University was awarded a Watershed Protection Grant to develop transplant guidelines for the use of sedges in riparian restoration projects. The project is to:
  a. Evaluate the performance of transplanted plugs of various sizes and species of sedges under three different grazing regimes,
  b. Quantify the herbaceous species composition and arrangement, of grazed and ungrazed plant communities at two study sites,
  c. Evaluate the effects of water stress and grazing on transplanted plugs of sedges under greenhouse conditions.
  Two montane riparian sites will be evaluated in the Coconino National Forest: Hoxworth Springs and Buck Springs.

Congressional Western Water Policy Review Advisory Commission – In 1992, Congress established a commission to undertake a comprehensive review of federal activities in the nineteen Western states (including Arizona) which may affect the allocation and use of water resources. A final report, including their recommendations was completed in 1998. In this report, the commission proposes principles by which any federal water program should be guided or judged against. These principles were:

- (Primary) Ensure sustainable use of resources
- Maintain national goals and standards
- Emphasize local implementation, innovation, and responsibility
- Provide incentives to achieve goals
- Respect existing water rights and appropriation systems
- Promote social equity
- Organize around hydrologic systems
- Translate goals to measurable objectives, assess performance through sound science, and where knowledge is incomplete use adaptive management.
- Employ participatory decision making
- Promote innovative funding

Proper Functioning Condition of Riparian and Wetland Areas -- ADEQ has also been working with US Forest Service and the Bureau of Land Management to establish a repository for riparian area Proper Functioning Condition data,

including a graphic display of sites and riparian conditions. In 2000, information from 517 sites were processed.

The US Geological Survey – The mission of the U.S. Geological Survey is to assess the quantity and quality of the earth resources of the Nation and to provide information that will assist resource managers and policy makers in making sound decisions. Assessment of water quality conditions and trends is an important part of this overall mission. Therefore, the U.S. Geological Survey publishes numerous reports and fact sheets about water-related resources in Arizona. Some of the recent publications of note include:

- *Ground Water Resources for the Future – Desert Basins of the Southwest* (Leake et al., 1999) is a fact sheet about the occurrent of ground water and consequences of ground water use.
- *Arsenic in Ground Water Resources of the United States* (USGS, 2000) is a fact sheet showing that most of Arizona has naturally high levels of arsenic and how the probable change in drinking water standards may affect public water systems.
- *Pesticides in the Atmosphere* (Majewski and Capel, 1995) is a fact sheet about the current understanding of how atmospheric deposition influences the distribution of pesticides.
- *A National Look at Nitrate Contamination of Ground Water* is a fact sheet published in the *Conditioning and Purification Magazine* (Nolan, et al, 1999) describes how USGS scientists have been able to map high and low risk areas of the nation for nitrate contamination.
- *Pesticides in Surface Waters* (Larson et al., 1997) is a fact sheet summarizing national and regional occurrence of pesticides in surface waters. It also looks at limitations in assessing the significance of pesticides in surface waters.
- *Pesticides in Stream Sediment and Aquatic Biota* (Newell et al., 2000) is a fact sheet summarizing the distribution of contamination, sources, trends, environmental fate, and biological significance.
- *Where do the Salts Go?* (Cordy and Bouwer, 1999) is a fact sheet looking at the potential effects and management of salt accumulation in south-central Arizona.
- *Occurrence and Quality of Surface Water and Ground Water within the Yavapai-Prescott Indian Reservation, Central Arizona, 1994-1998* (Littin, et al, 2000) summarizes water quality on this 1,395 Indian Reservation, identifies limitations for designated uses, and discusses potential for contamination from point and nonpoint sources.
- *Ground Water Quality in Alluvial Basins that have Minimal Urban Development, South-Central Arizona* (Gellenbeck and Coes, 1999) summarizes data from 772 wells in 16 alluvial basins with minimal urban development as a baseline to which water quality problems associated with urbanization can be compared.
- *Depth Profiles of Temperature, Specific Conductance, and Oxygen Concentration in Lake Powell, Arizona-Utah, 1992-95 (Marzolf, et. al., 1998)* reports on the measurements that establish vertical-density gradients that regulate the distribution of a wide array of chemical and biological features in the lake.
- *Determination of Channel Change for Selected Streams, Maricopa County, Arizona* (Capesius and Lehman, 2002) reports on the lateral and vertical change in the channel on seven stream sites with 10 to 30 years of record.
- *Daily and Seasonal Variability of pH, Dissolved Oxygen, Temperature, and Specific Conductance in the Colorado River Between the Forebay of Glen Canyon Dam and Lees Ferry, Northeastern Arizona, 1998-99.* USGS in cooperation with the Grand Canyon Monitoring and Research Center reports on the range of variation of these parameters as indicators of trophic productivity for the trout fishery occurring in this reach.
- *Computed Roughness Coefficients for Skunk Creek Above Interstate 17, Maricopa County, Arizona* (O'Day and Phillips). The USGS in cooperation with the Maricopa County Flood Control District established a stream channel roughness coefficient for Skunk Creek, based on flows ranging from 187 to 760 cfs, that can be transferred to similarly vegetated channels in arid and semiarid environments for flood management or other purposes.

Copies of these publications can be obtained by contacting the USGS at (502) 607-6671.

US Forest Service and Bureau of Land Management – Both agencies are guardians of public lands, and work to sustain the health, diversity and productivity of public lands for the use and enjoyment of present and future generations. To support this effort, several important guidance documents have been prepared.

- *Stream Channel Reference Sites: an Illustrated Guide to Field Techniques* (Harrelson et al., 1994). This document provides a guide to

establishing permanent reference sites for gathering data about physical characteristics of streams and rivers.

- *A Framework for Analyzing the Hydrologic Condition of Watersheds* (McCammon et al., 1998). The Bureau of Land Management and US Forest Service collaborated on this guidance document to provide a national framework for hydrologic analysis and a comprehensive interdisciplinary watershed analysis. The guidance outlines a process for identifying the essential factors to describe hydrologic condition from a vast array of possible factors.
- *Riparian Area Management -- Process for Assessing Proper Functioning Condition* (BLM, 1993) documents a process for assessing the physical function of a lotic (flowing water) ecosystem and the associated riparian or wetland area.
- *Riparian Area Management -- Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas* (BLM, 1999). This guidance modifies the process for assessing lentic systems (open waters such as lakes and marshes).
- *Riparian Area Management -- Process for Assessing Proper Functioning Condition for Lotic Riparian-Wetland Areas* (BLM, 1998). This guidance modifies the process outlined in 1993 for assessing lotic systems (flowing water).
- *Riparian Area Management -- Grazing Management for Riparian and Wetland Areas* (BLM, 1997) provides Best Management Practices for grazing to protect riparian and wetland areas.
- *Management for Enhancement of Riparian and Wetland Areas of Western United States* (BLM and USFS, 2000). This document provides Best Management Practices to preserve riparian and wetland areas in the Western United States.

The US Fish and Wildlife Service -- The USFWS is committed to working to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of American people. Most current USFWS reports are included in the following watershed discussion; however, one recent publication has a national perspective.

- *Status and Trends of Wetlands in the Conterminous United States 1986 to 1997* (Dahl, 2000) estimates the net loss of wetlands and the annual rate of loss, compares this rate to previous estimates, and attributes wetland losses and gains to land activities and federal, state, and local protective actions.
- *Contaminants in Potential Aplomado Falcon Prey from Proposed Reintroduction Sites in Arizona* (King, et al, 1995) reports on the concentrations of organochlorine compounds (historically used pesticides) and metals found in Aplomado falcon prey species (meadowlarks, mourning doves, lizards, and grasshoppers collected near Fort Huachuca and in San Simon Valley, the San Pedro Riparian National Conservation Area, San Bernadino/Leslie Canyon National Wildlife Refuge, and Empire Cienega Ranch.
- *Contaminants in Southwestern Willow Flycatcher Eggs and Prey Items, Arizona, 1998-2000* (King, et al, 2002) documents concentrations and potential effects of organochlorine compounds (historically used pesticides) and metals in addled eggs and potential prey of the endangered southwestern willow flycatcher collected at 10 Arizona breeding areas and one area in California.

United States and Mexico Border Issues -- The United States - Mexico border Field Coordinating Committee of the U.S. Department of Interior has published a series of fact sheets summarizing significant issues related to shared water resources along the United States and Mexico border.

- *Water Resources Issues in the Mexican Highlands Subarea* (U.S. - Mexico Border Field Coordinating Committee, 1997) looks at issues along the eastern half of Arizona on both sides of the border.

The US Environmental Protection Agency -- Numerous national water quality assessment guidance documents have been published by EPA, whose mission is to protect human health and safe guard the natural environment. Some of the important documents are available at EPA's website: www.epa.gov/owow. Recently published documents include:

- *2002 Integrated Water Quality Monitoring and Assessment Report Guidance* (November 2001) recommends that states provide a combined report that fulfills requirements of the Clean Water Act sections 305(b) and 303(d), and indicates the information that must be included in such a submission.
- *Draft Consolidated Assessment and Listing Methodology – Toward a Compendium of Best Practices* (USEPA, 2001) outlines a process to improve state monitoring and assessment programs.
- *Guidance for Assessing Chemical Contaminant Data for use in Fish*

Advisories. Volume 1-- Fish Sampling and Analysis. Volume 2 -- Risk assessment and fish consumption limits. Third edition. These two volumes provide methods for determining whether a fish advisory is necessary.

- *Stressor Identification Guidance Document* (USEPA, 2000) provides a formal and rigorous process that identifies stressors causing biological impairment in aquatic ecosystems and provides a structure for organizing the scientific evidence supporting the conclusions.
- *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers – Periphyton, Benthic Macroinvertebrates, and Fish* (USEPA, 1999) is a practical technical reference for conducting cost-effective biological assessment of lotic (flowing water) systems.
- *Nutrient Criteria – Technical Guidance Manual, Lakes and Reservoirs* (Gibson et al., 2000). This document provides guidance for assessing nutrient related trophic state impairment of lakes and methods for developing region-specific nutrient criteria. Four basic indicators of over-enrichment are identified as: total phosphorus, total nitrogen, algal chlorophyll and Secchi depth. An essential part of the process for developing nutrient criteria is to pay attention to downstream effects.
- *Protocols for Developing Sediment TMDLs* (USEPA, 1999). This TMDL protocol was developed to provide a framework for establishing TMDLs for sediment, but do not address contaminants that may be associated with sediments. The process presented will assist with development of rational, science-based assessments and decisions, and should lead to the establishment of an understandable and justifiable TMDL.
- *Lake and Reservoir Bioassessment and Biocriteria – Technical Guidance Document* (USEPA, 1998). This document provides methods and approaches for adapting bioassessments and biocriteria to assess lakes. Methods range from lake trophic state surveys to detailed bioassessments and habitat measurements.

Federal Interagency Stream Restoration Working Group – Fifteen federal agencies and partners produced a common reference manual on stream corridor restoration (2000). A copy can be obtain through the US Department of Agriculture website: http://www.usda.gov/stream_restoration/

- *Stream Corridor Restoration* (Federal Interagency Stream Restoration Working Group, 2000). This document encourages locally lead, public involvement in restoration planning and implementation.

Colorado Basin Salinity Control Program – Damage estimates caused by excessive salinity in the Colorado River Basin in the United States typically range between $500 million and $750 million per year. Since the 1970s, Reclamation has been working with the U.S. Department of Agriculture, the Bureau of Land Management, and seven states in the Colorado Basin Salinity Control Forum to build and operate salinity control projects on the Colorado River that provide a cost-effective reduction in river water salinity.

In 1994, the Colorado River Basin Salinity Control Act was amended to direct that a comprehensive program be developed for minimizing salt contributions from lands administered by that the Bureau of Land Management (BLM). Successes with the resource base will translate to improved vegetation cover, better use of onsite precipitation, and stronger plant root systems, resulting in a more stable runoff regime and reduced soil loss. Further the US Department of Agriculture was authorized to:

- Identify salt source areas and develop project plans for salinity control;
- Provide financial and technical assistance to land users to plan, install, and maintain salinity reduction practices, including voluntary replacement of incidental fish and wildlife values foregone;
- Conduct research, demonstration, and education activities ; and
- Monitor and evaluate program effectiveness.

In 1995, the Bureau of Reclamation opened the selection of projects to a "Request for Proposal" competitive process. The average cost of salinity control has subsequently dropped from about $70 per ton to $30 per ton. New salinity control projects are funded by a one-time grant that is limited to the competitive bid. Once constructed, the facilities are owned, operated, maintained, and replaced by the sponsors at their own expense.

The Federal Agriculture Improvement and Reform Act of 1996 further amended the US Department of Agriculture's role in salinity control by creating a new conservation program known as the Environmental Quality Incentives Program, which combined four conservation programs including USDA's Colorado River Salinity Control Program.

Watershed Specific Assessment Information

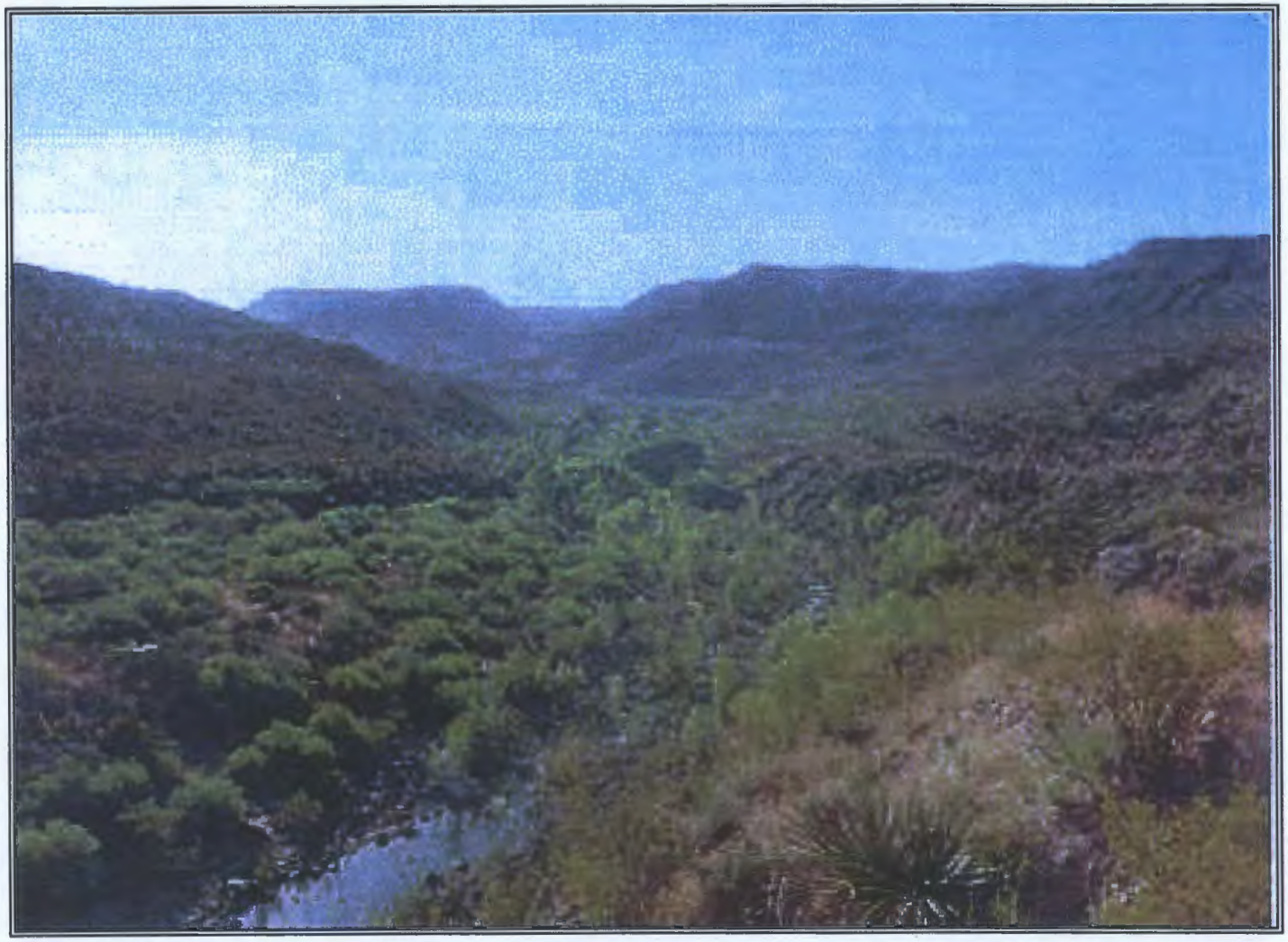
The rest of this Volume II contains watershed specific information about water quality conditions in Arizona. For each watershed, the following information is provided:

- General information characterizing the watershed, including a map of land ownership, a map of land uses (NPDES permits, urban areas, mines);
- Surface water quality monitoring tables, an assessment table, and an assessment map illustrating monitoring sites and final assessments;
- Ground water quality information, including a monitoring tables and maps illustrating the information on the tables and monitoring distribution; and
- Studies and water quality improvement activities in the watershed.

Surface Water Monitoring Tables – The information in the surface water monitoring tables may be the most valuable information in this report. This information is the basis for 303(d) listing and delisting decisions, and this information is cited by many federal and state programs that permit activities that may add further discharges to these surface waters. These tables provide the most comprehensive list of monitoring activities in Arizona.

A summary line was added to these tables for this assessment. This shaded row summarizes all of the monitoring data collected in that surface water and indicates the designated use support for each use. The summary row shows all exceedances that were used as the basis for this assessment, excluding any exceedances that were specifically exempted.

Bill Williams Watershed



BILL WILLIAMS WATERSHED CHARACTERISTICS						
SIZE	5,373 square miles (5% of the State's land area).					
POPULATION BASE	Approximately 8,000 people (estimated from the 2000 census). This is less than 0.2% of the state's population.					
LAND OWNERSHIP (**Figure 3**)	Bureau of Land Management	37%	State Lands	27%	Private land	27%
	Other state and federal	4%	U.S. Forest Service	5%		
LAND USES AND PERMITS (**Figure 4**)	This watershed is sparsely populated with no significant population centers. Open range grazing is the principal land use, with historic mining scattered across this watershed and with a large mining complex in the Bagdad area. Six wilderness areas are designated in this watershed. These areas are withdrawn from mineral entry and leasing and motorized travel is prohibited; however, grazing still occurs. A National Wildlife Refuge is also established along the Bill Williams near the Colorado River.					
HYDROLOGY AND GEOLOGY	The Santa Maria River and the Big Sandy River drainages merge at Alamo Lake to create the Bill Williams River. Surface water flow is primarily intermittent or ephemeral. Perennial flow is frequently interrupted (short segments). At Planet Ranch, the Bill Williams River flow varies from no flow (many days of the year) to 6,800 cfs (in 1993) (USGS 1996). Elevations in the watershed range from 8,417 feet at Hualapai Peak to 1,000 feet above sea level at Mohave Wash. These elevation differences split the region into two Hydrologic Provinces: Basin and Range Province in the west; Central Highlands Province in the east. Ground water basins include: Bill Williams, Big Sandy, and a portion of Sacramento Valley. Ground water occurs in alluvial deposits, basin-fill, and fractured or porous volcanic rocks. The main water-bearing unit is basin-fill. Alluvial deposits (consisting of gravel, sand, and silt) are found along the Bill Williams River and its tributaries, and have high water-yielding potential. Fractured or decomposed formations of schist, gneiss, and granite also have water-bearing potential. Volcanic rock formations have little water-yielding potential (ADWR 1994).					
UNIQUE WATERS	Burro Creek, Francis Creek, and Peoples Creek are all designated as "Unique Waters"					
ECOREGIONS	Colorado Plateau in the north, Arizona-New Mexico Mountains in the west, and the remaining area is Southern Basin and Range. The biota varies from lowland deserts to upland pine forests.					
OTHER STATES, NATIONS, TRIBES	None.					

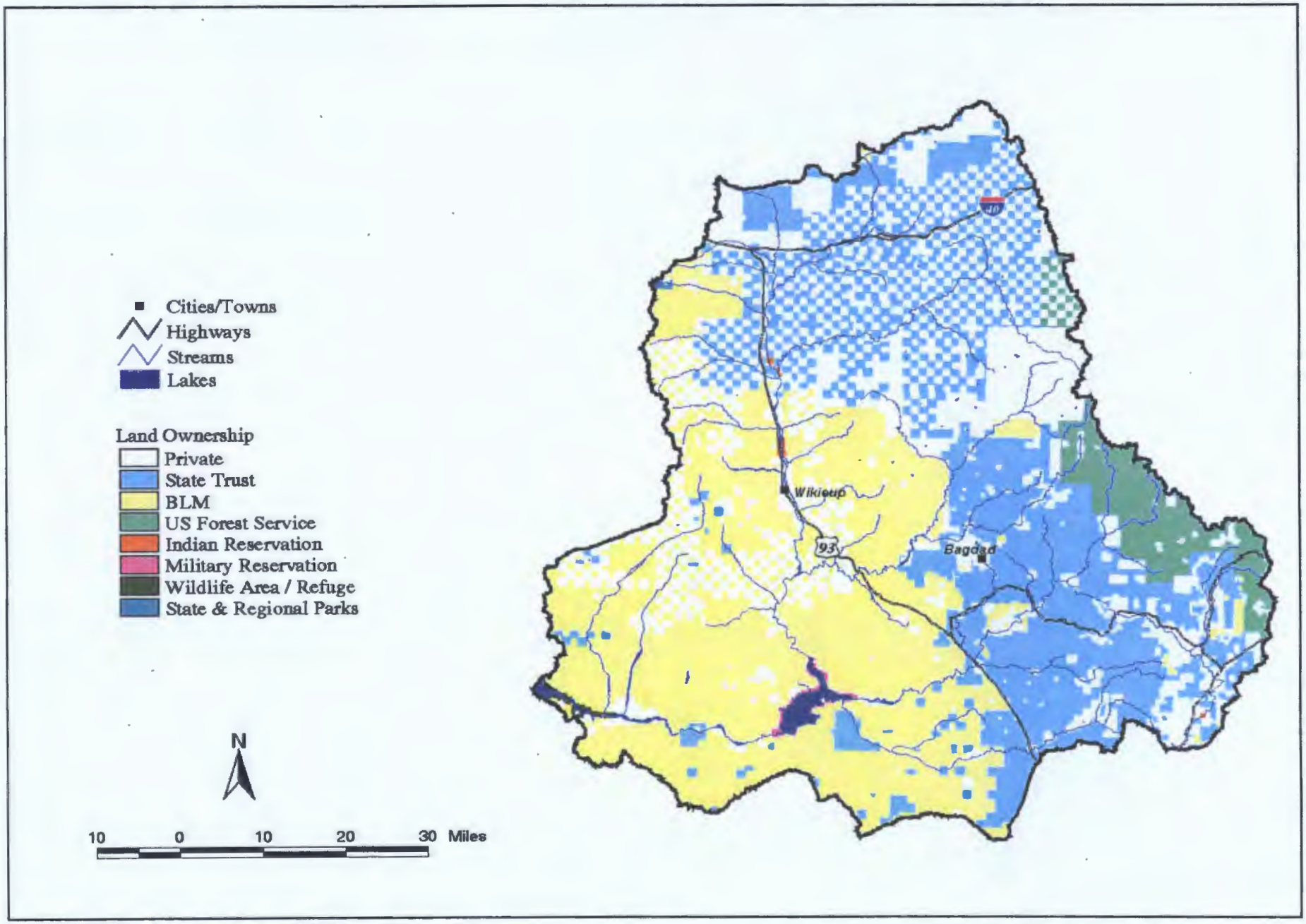


Figure 3. Land Ownership in the Bill Williams Watershed

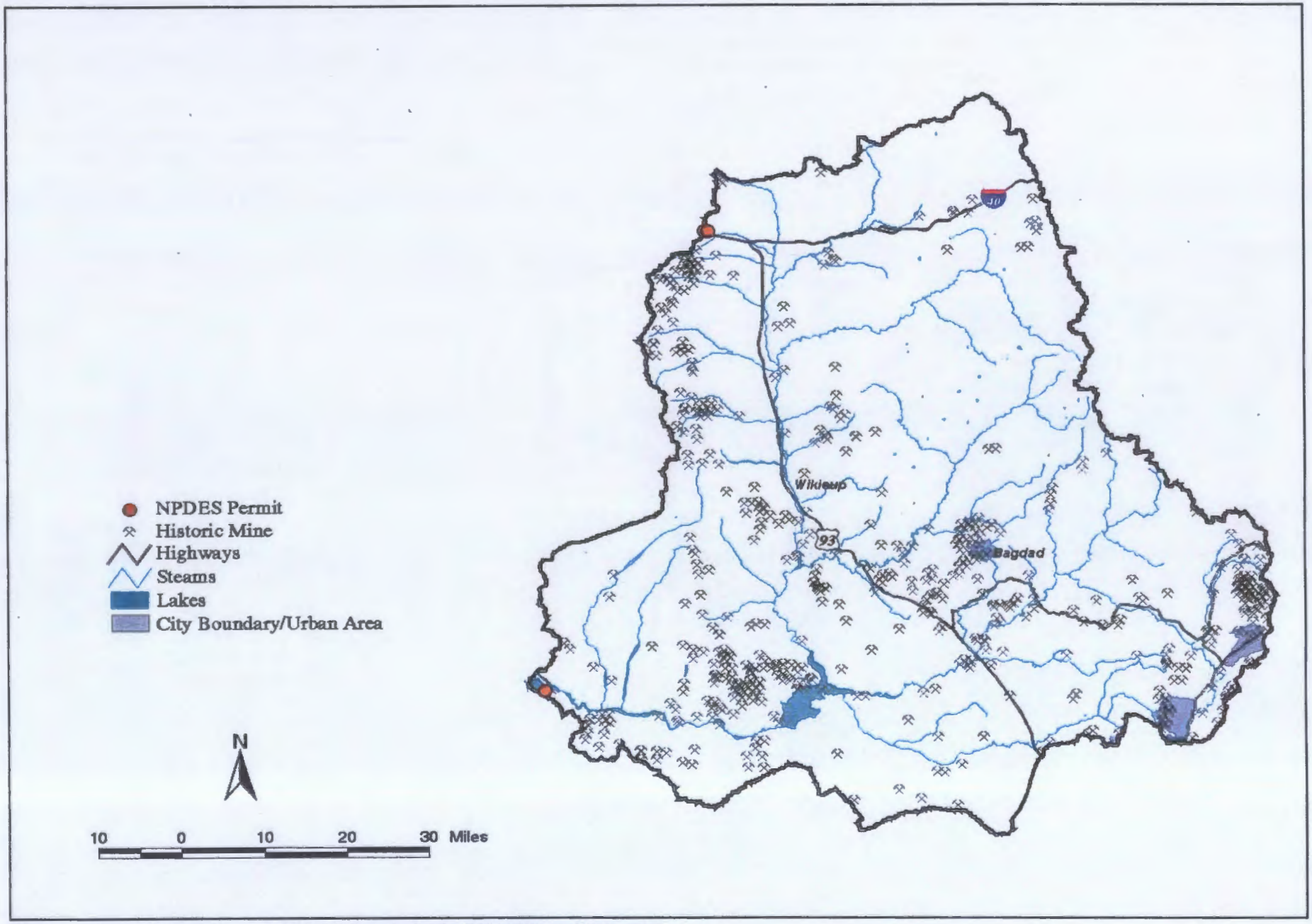


Figure 4. General Land Use and NPDES Permits in the Bill Williams Watershed

Bill Williams Watershed Assessment Discussion

Statistical Summary of Surface Water Assessments

Assessments – For the 2002 assessment, 179 stream miles and 1,414 lake acres were assessed. Fewer assessments were completed than previously because of two factors: 1) changes in assessment criteria requiring more data to base an assessment and 2) a lack of current credible data. This watershed is the focus watershed for monitoring in 2003 and that data will be used in the next assessment.

Water quality assessment information for the Bill Williams Watershed is summarized in the following tables and illustrated on **Figure 5.**

Table 3. Assessments in the Bill Williams Watershed – 2002

	STREAMS		LAKES	
	miles	number of segments	acres	number of lakes
ATTAINING	129	9	0	0
INCONCLUSIVE	18	2	0	0
IMPAIRED	32	2	1,414	1
NOT ATTAINING	0	0	0	0
TOTAL ASSESSED	179	13	1,414	1

PERENNIAL SURFACE WATERS ASSESSED		STREAMS		LAKES	
		miles	number of segments	acres	number of lakes
	Assessed	99	6	1,414	1

* Note that streams with significant perennial stretches within the reach assessed were included in the perennial milage although part of the reach may have ephemeral or intermittent flow.

Inconclusive assessments – Surface waters with some water quality data but insufficient data to determine if the water is attaining its uses or impaired were added to ADEQ's new Planning List. Before the end of the watershed monitoring scheduled in 2003, ADEQ expects to have additional water quality data for most of these reaches so that all designated uses can be assessed during the following assessment cycle. Other lakes and streams which lack any water quality data will also be monitored as resources and priorities allow. (See monitoring program discussion in Chapter VII.)

Major stressors–When a surface water is listed as impaired, the pollutants or suspected pollutants causing the impairment are identified. Only two reaches along Boulder Creek and Alamo Lake are to be listed as impaired.

Segments of Boulder Creek are impaired by metals and inorganics. Fluoride impairs Boulder Creek above Wilder Creek. Arsenic, copper and zinc impair the creek between Wilder and Butte Creek, while only arsenic impairs the creek below Butte Creek to Copper Creek. Current TMDL investigations indicate that natural sources and historic mining in the area are the sources of these pollutants. In-stream monitoring indicates that current mining operations in the Boulder Creek drainage are not contributing to the impairment.

Excessive nutrients may be causing the high pH and low dissolved oxygen readings at Alamo Lake, or these water quality problems may be caused by low flows because of an extended drought. In either case, the exceedances of the sulfide standards will be eliminated when EPA approves Arizona's new surface water standards, as exceedances occurred only in the hypolimnion (bottom level of lake water).

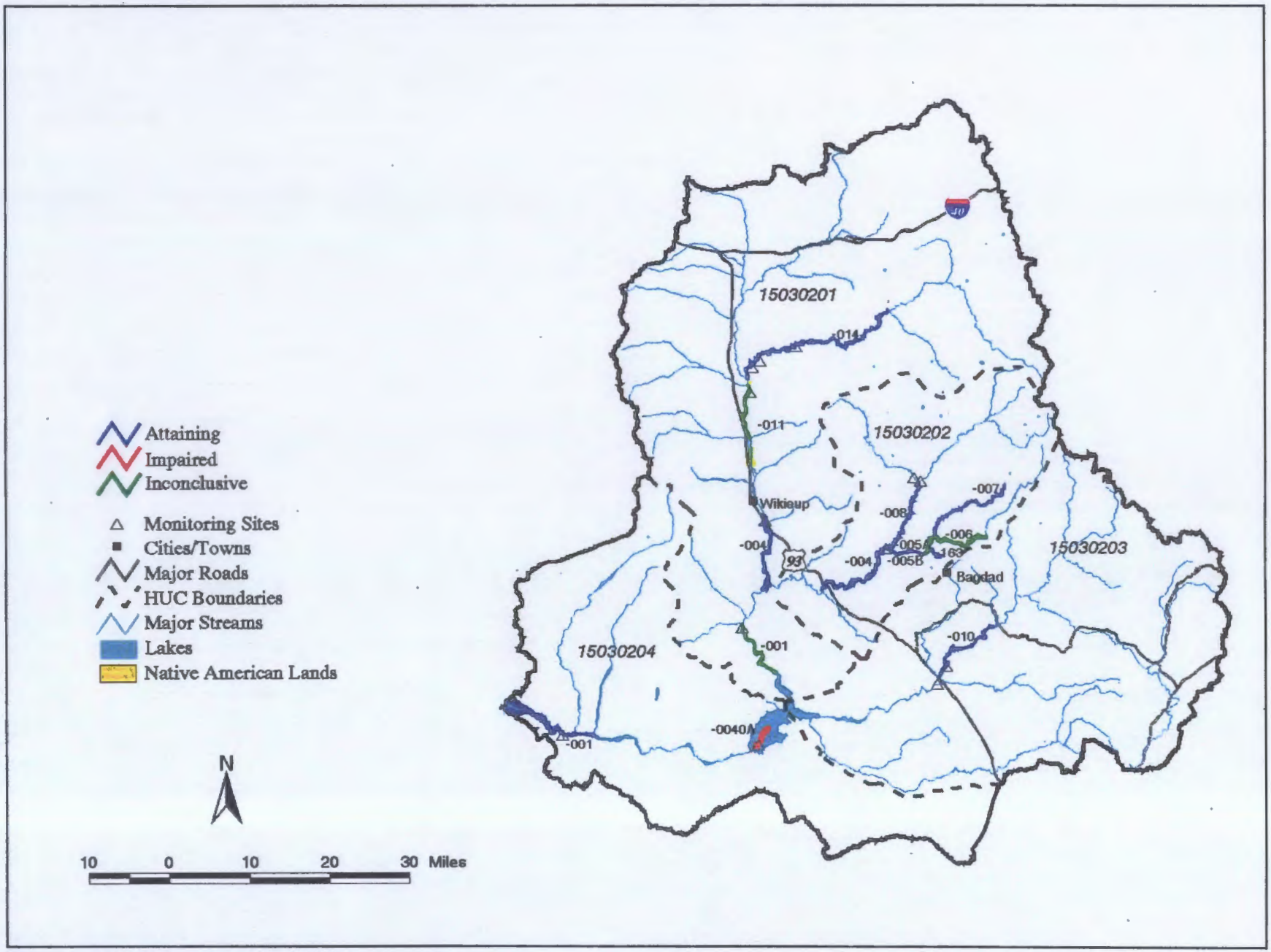


Figure 5. Bill Williams Watershed 2002 Assessments

TABLE 4. BILL WILLIAMS WATERSHED – 2002 ASSESSMENT – MONITORING DATA TABLE

STREAM NAME SEGMENT WATERBODY ID DESIGNATED USES	AGENCY AND AGENCY PROGRAM SITE DESCRIPTION SITE CODE ADEQ DATABASE ID	YEAR SAMPLED YEARS SAMPLED TYPE OF SAMPLES SAMPLING EVENTS	STANDARDS EXCEEDED AT THIS SITE PER SAMPLING EVENT					
			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
STREAMS MONITORING DATA								
Big Sandy River Deluge Wash-Tule Wash AZ15030201-011 AW&w, FBC, FC, AgL	ADEQ Fixed Station Below Cane Springs BWBSR041.02 100458	1999 - 4 field	Turbidity NTU	50 (A&Ww)	7 - 66	1 of 4		
	Reach Summary Row A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive	1999 4 sample events Missing core parameters	Turbidity NTU	50 (A&Ww)	7 - 66	1 of 4	Inconclusive	ADEQ collected 4 samples in1999. Reach assessed as "inconclusive" due to missing core parameters
Big Sandy River Sycamore-Burro AZ15030201-004 A&Ww, FC, FBC, AgL	ADEQ Fixed Station Below highway 93, Wickiup BWBSR024.50 100400	1999 - 3 suites, 2 field 2000 - 4 suites	Dissolved oxygen mg/L	6.0 (90% saturation)	4.98-8.2 (69-91% saturation)	2 of 9		Field staff documented that naturally occurring ground water upwelling rather than any anthropogenic activities caused the low dissolved oxygen; therefore, not considered in the final assessment.
	Reach Summary Row A&Ww Attaining FC Attaining FBC Attaining AgL Attaining	1999-2000 9 sampling events	OK				Attaining	ADEQ collected 9 samples in 1999-2000. Reach assessed as "attaining all uses."
Big Sandy River Rupley-Alamo Lake North AZ15030201-001 A&Ww, FC, FBC, AgL	ADEQ Fixed Station Near Signal BWBSR011.20 100457	1999 - 5 field, 1 TSS	OK					
	Reach Summary Row A&Ww Inconclusive FC Inconclusive FBC Inconclusive AgL Inconclusive	1999 5 sampling events Missing core parameters	OK				Inconclusive	ADEQ collected a total of 6 field samples in 1999. Reach assessed as "inconclusive" and added to Planning List due to missing core parameters.
Bill Williams River point B-Colorado River AZ15030204-001 A&Ww, FC, FBC, AgL	USGS Station #09426600 Near Planet BWBWR005.88 100924	1996 - 2 suites 1997 - 2 suites 1998 - 2 suites 1999 - 2 suites 2000 - 2 suites	Dissolved oxygen mg/L	6.0 (90% saturation) (A&Ww)	4.8-8.4 (55-86%) saturation	1 of 10		Missing core parameters: beryllium and Escherichia coli.
	Reach Summary Row A&Ww Attaining FC Attaining FBC Inconclusive AgL Attaining	1997-2000 10 sampling events Missing core parameters.	Dissolved oxygen mg/L	6.0 (90% saturation) (A&Ww)	4.8-8.4 (55-86%) saturation	1 of 10	Attaining	US Geological Survey collected 10 samples in 1997-2000. Reach assessed as "attaining some uses." Add to Planning List due to missing core parameters.

TABLE 4. BILL WILLIAMS WATERSHED -- 2002 ASSESSMENT – MONITORING DATA TABLE

STREAM NAME SEGMENT WATERBODY ID DESIGNATED USES	AGENCY AND AGENCY PROGRAM SITE DESCRIPTION SITE CODE ADEQ DATABASE ID	YEAR SAMPLED YEARS SAMPLED TYPE OF SAMPLES SAMPLING EVENTS	STANDARDS EXCEEDED AT THIS SITE PER SAMPLING EVENT					
			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
Boulder Creek headwaters - Wilder Creek AZ15030202-006 A&Ww, FC, FBC, AgI, AgL	Phelps Dodge Bagdad Mine Instream Monitoring Above Hillside Mine Hillside - 2	1997 - 3 suites 1998 - 4 suites 1999 - 1 suite 2000 - 3 suites	OK					Missing core parameters: stream flow, dissolved oxygen, nitrogen, bacteria, beryllium, and boron
	Phelps Dodge Bagdad Mine Instream Monitoring Below Tungstona Mine Tungstona - 1	1997 - 3 suites 1998 - 4 suites 1999 - 1 suite 2000 - 3 suites	Fluoride/Fluorine mg/L	8.4 (FBC)	1.2 - 23.3	8 of 11		
	Phelps Dodge Bagdad Mine Instream Monitoring Above Tungstona Mine Tungstona - 2	1997 - 3 suites 1998 - 4 suites 1999 - 1 suite 2000 - 4 suites	OK					
	ADEQ TMDL Program N Above Wilder Creek	2001 - 7 metals, field 2002 - 1 metal, field	OK					Laboratory Detection Limit for beryllium was not low enough to assess Fish Consumption. Laboratory Detection Limit for dissolved copper was not low enough to assess A&Ww in 5 of 8 samples.
	Reach Summary Row **A&Ww Inconclusive** **FBC Impaired** **FC Attaining** **AgI Inconclusive** **AgL Attaining**	**1997 - 2000** **34 sampling events** **Missing core parameters**	**Fluoride/Fluorine mg/L**	**8.4 (FBC)**	**1.2 - 23.3**	**8 of 34**	**Impaired**	**Phelps Dodge monitored 3 sites in 1997-2000 with a total of 44 samples. ADEQ monitored 1 site in 2001-2002 (included as part of TMDL investigation of lower reach). Reach assessed as "impaired" due to fluoride. Add to Planning List due to missing core parameters.**
Boulder Creek Wilder Creek-Copper Creek AZ15030202-005A A&Ww, FC, FBC, AgI, AgL	Phelps Dodge Bagdad Mine Instream Monitoring Above Copper Creek Boulder - 2	1997 - 2 suites 1998 - 4 suites 1999 - 1 sulte 2000 - 3 suites	OK					Missing core parameters: stream flow, dissolved oxygen, nitrogen, bacteria, beryllium, and boron.
	Phelps Dodge Bagdad Mine Instream Monitoring Below Hillside Mine Hillside - 1	1997 - 3 suites 1998 - 4 suites 1999 - 1 suite 2000 - 4 suites	Arsenic µg/L	50 (FBC)	10 - 70	1 of 12		
			pH SU	6.5 - 9.0 (A&Ww, FBC, AgI, AgL)	7.2 - 9.5	1 of 12		
	ADEQ TMDL Program B Below Copper Creek	2001 - 7 metals, field	Arsenic µg/L	50 µg/L FBC	11 - 52	1 of 7		The Laboratory Detection Limit for beryllium samples was not low enough to assess Fish Consumption. Method Detection Limit for dissolved copper was not low enough to assess the Aquatic and Wildlife designated use in 6 of 51 samples.
	ADEQ TMDL Program E Below Butte Creek	2001 - 6 metals, field	Arsenic µg/L	50 µg/L FBC	11 - 76	3 of 6		
	ADEQ TMDL Program G Above Butte Creek and below lower tailings piles	2001 - 7 metals, field	Arsenic µg/L	50 µg/L FBC	<5 - 74	4 of 7		

TABLE 4. BILL WILLIAMS WATERSHED -- 2002 ASSESSMENT – MONITORING DATA TABLE								
STREAM NAME SEGMENT WATERBODY ID DESIGNATED USES	AGENCY AND AGENCY PROGRAM SITE DESCRIPTION SITE CODE ADEQ DATABASE ID	YEAR SAMPLED YEARS SAMPLED TYPE OF SAMPLES SAMPLING EVENTS	STANDARDS EXCEEDED AT THIS SITE PER SAMPLING EVENT					
			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	ADEQ TMDL Program H Below Hillside Mine	2001 - 11 metals, field 2002 - 2 metals, field	Arsenic µg/L	50 µg/L (FBC)	<5 - 287	9 of 13		
	ADEQ TMDL Program J Above Hillside Mine	2001 - 6 metals, field	OK					
	ADEQ TMDL Program JJ At upstream tailings pile	2001 - 3 metals, filed 2002 - 1 metals, field	Arsenic µg/L	50 µg/L (FBC)	15-58	1 of 4		
			Copper (total) µg/L	500 µg/L (AgL)	<15 - 15,200	1 of 4		
			Copper (dissolved) µg/L	varies	<15 - 14,400	2 of 4		
			Dissolved oxygen mg/L	6.0 (90% sat.)	5.48 - 8.49	1 of 4		
			Manganese µg/L	10,000 (AgI) 19,600 (FBC)	30 - 23,400	1 of 4		
			Zinc (total) µg/L	10,000 (AgI) 22,000 (FC) 25,000 (AgL) 42,000 (FBC)	100 - 129,000	1 of 4		
			Zinc dissolved µg/L	varies	60-115,000	2 of 4		
	ADEQ TMDL Program L Above Hillside Mine and tailings	2001 - 4 metals, field	OK					

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	Reach Summary Row A&Ww Impaired FBC Impaired FC Attaining AgI Inconclusive AgL Attaining	1997 - 2000 95 samples 25 sampling events Missing core parameters	Arsenic µg/L	50 µg/L (FBC)	15-58	19 of 69	Impaired	Phelps Dodge monitored 2 sites in 1997-2000 and ADEQ monitored 8 sites with a total of 69 samples. Reach assessed as "impaired" due to arsenic, copper, and zinc. Add to Planning List due to missing core parameters and insufficient method detection limits (beryllium). Data collected by ADEQ after October 2000 was included in this assessment because this newer data showed that the reach should remain on the 303(d) List due to arsenic, copper and zinc impairments. Copper and zinc contamination of Boulder Creek appears primarily at the upper tailing pile and the arsenic contamination extends down to Copper Creek. Old reach was segmented at Copper Creek, as the reach is meeting standards below Copper Creek.
			Copper (total) µg/L	500 µg/L (AgL)	<15 - 15,200	1 of 69	Attaining	
			Copper (dissolved) µg/L	varies (&Ww)	<15 - 14,400	2 of 69 2 within 1 year	Impaired (only below upper tailings)	
			Dissolved oxygen mg/L	6.0 (90% sat.)	5.48 - 8.49	1 of 69	Attaining	
			Manganese µg/L	10,000 (AgI) 19,600 (FBC)	30 - 23,400	1 of 69	Attaining	
			pH SU	6.5 - 9.0 (A&Ww, FBC, AgI, AgL)	7.2 - 9.5	2 of 69	Attaining	
			Zinc (total) µg/L	10,000 (AgI) 22,000 (FC) 25,000 (AgL) 42,000 (FBC)	100 - 129,000	1 of 69	Attaining	
			Zinc dissolved µg/L	varies (A&Ww)	60-115,000	2 of 69 (2 in a 3 years)	Impaired (only below upper tailings)	
Boulder Creek Copper Creek-Burro Creek AZ15030202-005B A&Ww, FC, FBC, AgI, AgL	Phelps Dodge Bagdad Mine Instream Monitoring Below Copper Creek Boulder - 1	1997 - 3 suites 1998 - 4 suites 1999 - 1 suite 2000 - 4 suites	pH SU	6.5 - 9.0 (A&Ww, FBC, AgI, AgL)	7.7 - 9.4	1 of 12		Missing core parameters: stream flow, dissolved oxygen, bacteria, beryllium, and boron.
	Phelps Dodge Bagdad Mine Instream Monitoring Below Copper Creek Boulder - 4	1997 - 2 suites 1998 - 4 suites 2000 - 4 suites	OK					
	ADEQ TMDL Program A Near Burro Creek	2001 - 6 metals, field	Dissolved oxygen mg/L	6.0 (90% saturation)	3.94-11.54	1 of 5		Field staff documented that naturally occurring ground water upwelling rather than any anthropogenic activities caused the low dissolved oxygen; therefore, not considered in the final assessment. Laboratory Detection Limits for all beryllium samples and one dissolved copper sample were not low enough to base an assessment.

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	Reach Summary Row **A&Ww Attaining** **FC Attaining** **FBC Inconclusive** **AgI Inconclusive** **AgL Attaining**	**1997 - 2001** **28 samples** **18 sampling events**	**OK**				**Attaining**	**Phelps Dodge collected 22 samples at 2 sites and ADEQ collected 6 samples at one site. Reach assessed as "attaining some uses." Add to Planning List to pick up missing bacteria, beryllium, and boron samples.**
Burro Creek Boulder-Black Canyon AZ15030202-004 A&Ww, FC, FBC, AgL	ADEQ/BLM Unique Waters Monitoring Below Boulder Creek BWBRO011.53 100403	2000 - 3 suites	OK					
	Phelps Dodge Bagdad Mine Instream Monitoring At Suicide Wash Burro 2	1997 - 3 suites 1998 - 4 suites 1999 - 1 suite 2000 - 4 suites	OK					Missing core parameters: stream flow, dissolved oxygen, nitrogen, bacteria, beryllium, and boron
	Phelps Dodge Bagdad Mine Instream Monitoring Below Mammoth Wash Burro - 4	1997 - 2 suites 1998 - 4 suites 1999 - 1 suite 2000 - 3 suites	OK					
	Reach Summary Row **A&Ww Attaining** **FC Attaining** **FBC Attaining** **AgL Attaining**	**1997 - 2000** **11 sampling events**	**OK**				**Attaining**	**ADEQ/Beau of Land Mgt. collected 3 samples in 2000. Phelps Dodge collected 23 samples at 2 sites in 1997-2000. This reach is assessed as "attaining all uses."**
Burro Creek Francis Creek - Boulder Creek AZ15030202-008 A&Ww, FC, FBC, AgL (Unique Waters)	Phelps Dodge Bagdad Mine Instream Monitoring Above Boulder Creek Burro - 3	1997 - 2 suites 1998 - 4 suites 1999 - 1 suite 2000 - 4 suites	OK					Missing core parameters: stream flow, dissolved oxygen, nitrogen, bacteria, beryllium, and boron
	Reach Summary Row **A&Ww Inconclusive** **FC Attaining** **FBC Inconclusive** **AgL Attaining**	**1997-2000** **11 sampling events** **Missing some core parameters.**	**OK**				**Attaining**	**Phelps Dodge monitoring at 1 site in 1997-2000. Reach assessed as "attaining some uses." Add to Planning List due to missing core parameters.**
Burro Creek Pine-Francis Creek AZ15030202-009 A&Ww, FC, FBC, AgL	ADEQ Biocriteria Program Above Francis Creek BWBRO019.21 100426	1997 - 1 suite	OK					
	Reach Summary Row	**1997** **1 sampling event**	**OK**				**Not assessed**	**Insufficient data to assess.**

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
Butte Creek headwaters - Boulder Creek AZ15030202-163 A&Ww, FBC, FC, AgI, AgL	Phelps Dodge Bagdad Mine Permit Monitoring At Butte Creek Butte - 1	1997 - 2 suites 1998 - 4 suites 2000 - 2 suites	OK					Missing core parameters: stream flow, dissolved oxygen, nitrogen, bacteria, beryllium, and boron
	Reach Summary Row **A&Ww Inconclusive** **FC Attaining** **FBC Inconclusive** **AgI Inconclusive** **AgL Attaining**	**1997-2000** **8 sampling events**	**OK**				**Attaining**	**Phelps Dodge collected 8 samples between 1997-2000 at this site. Reach assessed as "attaining some uses." Add to Planning List due to missing core parameters.**
Conger Creek headwater-Burro Creek AZ15030202-014 A&Ww, FC, FBC, AgL	ADEQ Biocriteria Program Below Conger Springs BWCNG003.82 100432	1997 - 1 suite	OK					
	Reach Summary Row	**1997** **1 sampling event**	**OK**				**Not assessed**	**Insufficient data to assess.**
Francis Creek headwaters-Burro Creek AZ15030202-012 A&Ww, FBC, FC, DWS, AgL	ADEQ Biocriteria Program Above road crossing BWFRA000.79 10555	1997 - 1 dissolved metals and turbidity	OK					
	Reach Summary Row	**1997** **1 sampling event**	**OK**				**Not assessed**	**Insufficient data to assess.**
Santa Maria River South Fork-Bridle AZ15030203-010 A&Ww, FC, FBC, AgI, AgL	ADEQ Biocriteria Program Above Highway 93 BWSMR015.10 100647	1997 - 1 suite	OK					
	ADEQ Ambient monitoring Below Highway 93 bridge BWSMR013.57 100399	2000 - 2 suites	Dissolved oxygen mg/L	6.0 (90% saturation)	4.0 - 9.5 (54 - 103 saturation)	1 of 4		Field staff documented that naturally occurring ground water upwelling rather than any anthropogenic activities caused the low dissolved oxygen; therefore, not considered in the final assessment.
	Reach Summary Row **A&Ww Attaining** **FC Attaining** **FBC Attaining** **AgL Attaining**	**1997** **3 sampling events**	**OK**				**Attaining**	**ADEQ monitoring collected 3 samples between 1997-2000. Reach assessed as "attaining all uses."**